

1 IN THE CIRCUIT COURT FOR THE 11TH JUDICIAL
2 CIRCUIT IN AND FOR DADE COUNTY, FLORIDA

3 GENERAL JURISDICTION DIVISION
4

Case No. 00-01706 CA 22

5 LYNN FRENCH,

6 Plaintiff,

7 vs.

8 PHILIP MORRIS INCORPORATED,

9 ("PHILIP MORRIS U.S.A.")

R.J. REYNOLDS TOBACCO COMPANY,

10 LORILLARD TOBACCO CO., and

BROWN & WILLIAMSON TOBACCO

11 CORP., Individually and as Successor

to the AMERICAN TOBACCO COMPANY,

12 Defendants.
13 -----X
14

PROCEEDINGS BEFORE

15 THE HONORABLE FREDRICKA SMITH

16 VOLUME 14

17 Thursday, June 13, 2002

1:30 p.m. to 6:00 p.m.

18 73 West Flagler Street
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21
22
23

24 Courtroom 6-2

Miami, Florida 33130
25

1 APPEARANCES:
 2 GROVER WEINSTEIN & TROP P.A.
 3 7th Floor, Concord Building
 4 66 West Flagler Street
 5 Miami, Florida 33130
 6 Phone: (305) 377-4840
 7 By: MARVIN WEINSTEIN, ESQ.
 8 ADAM TROP, ESQ.
 9 RHONDA WEINSTEIN, ESQ.
 10 Attorneys for Plaintiff
 11
 12 WOMBLE CARLYLE SANDRIDGE & RICE, LLP
 13 One West Fourth Street
 14 Winston-Salem, North Carolina 27101
 15 Phone: (336) 721-3549
 16 By: JONATHAN ENGRAM, ESQ.
 17 Attorneys for Defendant R.J. Reynolds
 18
 19 SHOOK, HARDY & BACON, L.L.P.
 20 2400 Miami Center
 21 201 South Biscayne Boulevard
 22 Miami, Florida 33131-4332
 23 Phone: (305) 358-5171
 24 By: KENNETH REILLY, ESQ.
 25 WILLIAM GERAGHTY, ESQ.
 GAY TEDDER, ESQ.
 Attorneys for Defendant Philip Morris Incorporated
 and Lorillard Tobacco Co.
 ADORNO & YOSS, P.A.
 2601 South Bayshore Drive, Suite 1600
 Miami, Florida 33133
 (305) 858-5555
 BY: WILLIAM C. MCCUE, ESQ.
 Attorneys for Defendant Brown & Williamson Tobacco
 Corp., individually and as successor to the
 American Tobacco Company

PROCEEDINGS

THE COURT: Have a seat. A couple of our jurors were running a little late, but they're all here now.

So bring them in.

MR. TROP: Judge, may I raise something very briefly about the next witness that's coming up? Joyce Coleman, in an abundance of caution, I understand that Ms. Coleman is African-American and we have several jurors who are African-American. It appears from her Web site that she does a lot of charity work and does a lot of charity work for African-American causes.

THE COURT: Who is she now?

MS. TEDDER: She's a corporate VP for TWA, former.

THE COURT: So you're asking that they not go into that background.

Were you going to?

MS. TEDDER: No.

MR. TROP: And of course she talks in her deposition about choice, that bidding process.

THE COURT: Were you going to go into

INDEX

Page:Line

1
 2 JOYCE COLEMAN
 DIRECT EXAMINATION
 3 BY MS. TEDDER..... 2000:23
 CROSS EXAMINATION
 4 BY MR. TROP..... 2038:3
 DIRECT EXAMINATION (CONTINUED)
 5 BY MS. TEDDER..... 2038:23
 CROSS EXAMINATION (CONTINUED)
 6 BY MR. TROP..... 2040:25
 REDIRECT EXAMINATION
 7 BY MS. TEDDER..... 2053:25
 8
 RODNEY TOBE SANDS, P.E.
 9 DIRECT EXAMINATION
 BY MR. ENGRAM..... 2059:11
 10 CROSS EXAMINATION
 BY MR. WEINSTEIN..... 2112:20
 11 REDIRECT EXAMINATION
 BY MR. ENGRAM..... 2144:8
 12 RECROSS EXAMINATION
 BY MR. WEINSTEIN..... 2152:11
 13
 14
 15
 16
 17
 18
 19
 20
 21
 22
 23
 24
 25

that?

MS. TEDDER: No.

One other housekeeping matter, I think the parties have now agreed on certain exhibits that are being -- Defendants' Exhibit 1950, I believe, has already been admitted into evidence.

And, Rhonda, you correct me if I'm wrong on any of these, but I believe the exhibits to which the parties have agreed are Defendant's Exhibit 1957. Defendants' Exhibit 1963. Defendants' Exhibit 1965, Defendants' Exhibit 2016, Defendants' Exhibit 2021, Defendants' Exhibit 2030. Defendants' Exhibit 2052. Defendants' Exhibit 2131. Defendants' Exhibit 2132.

And with respect to Defendants' Exhibit 1954 parties do not object and agree to pages 1 through 5, but they do not agree that pages 6 through 12 should be in.

In fact, I think we both agree they shouldn't.

THE COURT: So that's all agreed to?

MS. TEDDER: Yes, ma'am.

MS. WEINSTEIN: There's one other in

1 dispute. Exhibit 1967, the Defendants
 2 indicate they object to portions of it. But
 3 I've tried to ask them to identify which
 4 portions they want in and we have a dispute
 5 about that on who is supposed to identify what
 6 goes in and what goes out.
 7 THE COURT: Does it affect the next two
 8 witnesses?
 9 MR. REILLY: No.
 10 THE COURT: Let's go ahead and bring the
 11 jury in, so we'll have Ms. Coleman and then
 12 Mr. Sands.
 13 MR. REILLY: We would submit Defendants'
 14 Exhibit 2139, which is that portion of the
 15 Surgeon General's Report that has the single
 16 sentence in it.
 17 THE COURT: Page 65 or whatever that is?
 18 MR. WEINSTEIN: Well, Judge, it's in, but
 19 as you may recall we still have to provide to
 20 you sections -- I mean, we haven't been able
 21 to go through.
 22 THE COURT: But that part is in?
 23 MR. WEINSTEIN: Yes, I'm only saying that
 24 subject also, we're putting in other sections
 25 that you will rule on and we obvious --

1 THE COURT: If there's any other context
 2 in it that directly relates to it, I remember
 3 it was a separate little heading and a
 4 separate paragraph. I don't think that it's
 5 not in context. But if you want to put
 6 anything around it that you think affects the
 7 meaning of that, I'll hear you. But I
 8 remember what it looked like on the page and
 9 it seemed like it was a separate entry. I
 10 have your copy here.
 11 MR. WEINSTEIN: Yes, that was my biggest
 12 problem. I won't have it until tomorrow,
 13 Judge, but it's all right?
 14 THE COURT: Here it is page 65.
 15 May have I it overnight?
 16 THE COURT: Sure, you may have it.
 17 THE CLERK: Which exhibit is that, please
 18 for ID, counsel?
 19 MR. TROP: 1-B.
 20 THE CLERK: Part of Plaintiff's 1-B the
 21 Plaintiff's attorney will be taking it and
 22 bringing it back overnight.
 23 MS. TEDDER: This is the list that I
 24 read.
 25 THE CLERK: Okay.

1 MR. REILLY: Actually, Your Honor, I
 2 think you indicated most recently that you
 3 weren't going to allow them to put in more
 4 sections, only the testimony from Dr. Richmond
 5 and Dr. --
 6 THE COURT: I think what I said was that
 7 the portions that are relevant I think have
 8 been referred to already in the testimony of
 9 these witnesses. Now, whether the plaintiff
 10 wants to separately mark those, I mean, that's
 11 a possibility since the Defendant is
 12 separately marking your portion.
 13 So if the Plaintiffs want to offer the
 14 portions that have already been referred to by
 15 the witnesses and actually publish them since
 16 I think they were read, I'll let the Plaintiff
 17 do that just as the Defendants' separately
 18 entered theirs.
 19 MS. TEDDER: Defendants' Exhibit 2139 is
 20 the excerpt from the 1986 Surgeon General's
 21 Report, the health consequences of involuntary
 22 smoking, page 65. This is that portion that
 23 the court said we could submit into evidence.
 24 MR. WEINSTEIN: We would object. We
 25 object because it's put out of context.

1 THE COURT: Okay, bring them in, please.
 2 (Jury enters courtroom.)
 3 THE COURT: Morning -- I mean, afternoon.
 4 We've actually been here for quite a while
 5 this morning, have a seat, please, everybody.
 6 But it is definitely afternoon. And we'll
 7 proceed with the next witness for the
 8 Defendant.
 9 The Plaintiff has rested. The Defendant
 10 had called one witness out of turn,
 11 Dr. Torres, but now the Plaintiff has
 12 completed their testimony. And we're going to
 13 the other witnesses for the Defendants.
 14 Who will your next witness be?
 15 MS. TEDDER: The defense calls Joyce
 16 Coleman, Your Honor.
 17 THEREUPON,
 18 JOYCE COLEMAN,
 19 having been first duly sworn, was examined and
 20 testified as follows:
 21 THE COURT: Come around and have a seat
 22 in this chair.
 23 DIRECT EXAMINATION
 24 BY MS. TEDDER:
 25 Q. Good afternoon, Ms. Coleman.

1 A. Good afternoon.
 2 Q. Will you please formally introduce
 3 yourself to the jury?
 4 A. My name is Joyce Coleman.
 5 Q. Ms. Coleman, where do you live?
 6 A. I live in St. Louis, Missouri.
 7 Q. What do you do for a living?
 8 A. I'm retired TWA vice-president and I've
 9 since started a consulting business.
 10 Q. Can you tell us how long you were with
 11 TWA?
 12 A. Yes. 31 years.
 13 Q. What is the position that you held when
 14 you retired from TWA?
 15 A. I was the vice-president of inflight
 16 services.
 17 Q. And what year did you retire from TWA?
 18 A. August 1st, 1999.
 19 Q. We're going to talk about your work
 20 history with TWA in just a couple of minutes, but
 21 I'd like to spend a little bit of time on your
 22 background. Can you tell the jury, tell us where
 23 you went to college?
 24 A. I went to college at Alcorn State
 25 University in Lorman, Mississippi.

1 Q. When did you graduate from Alcorn State
 2 University?
 3 A. In 1965.
 4 Q. What degree did you earn?
 5 A. B.S. degree in chemistry.
 6 Q. Did you have any post graduate education?
 7 A. Yes, I went to the University of Oklahoma
 8 at Norman, Oklahoma and I studied physical
 9 chemistry there and completed research.
 10 Q. You said you spent 31 years with TWA, can
 11 you tell us, when did you begin work for TWA?
 12 A. In April of 1968.
 13 Q. And when you went to work for TWA, what
 14 position did you hold?
 15 A. I was a flight attendant flying out of
 16 the Kennedy domicile on the international
 17 operation.
 18 Q. How long did you hold that position?
 19 A. Until 1969.
 20 Q. So that's a little over a year?
 21 A. Little over a year.
 22 Q. When you were a flight attendant, was
 23 smoking allowed on board the aircraft?
 24 A. Yes, it was.
 25 Q. Can you tell us what you recall about

1 that?
 2 A. Well, there weren't smoking zones. There
 3 was smoking on the aircraft, but there were no
 4 smoking zones in those days.
 5 Q. Do you recall people smoking on the
 6 aircraft?
 7 A. Yes, they did smoke.
 8 Q. What do you recall about the conditions?
 9 A. You know, I remember that people smoked,
 10 but I don't remember any kind of conditions
 11 specifically.
 12 Q. You said you were a flight attendant for
 13 approximately a year and a half?
 14 A. Yes.
 15 Q. After that what did you do for TWA?
 16 A. Well, in 1969, I went to Chicago as a
 17 supervisor of flight attendants.
 18 Q. How long did you hold that position?
 19 A. I held that position until about
 20 September of 1974.
 21 Q. And what did that position involve?
 22 A. Well, as a supervisor of flight
 23 attendants I had from 80 to 100 flight attendants
 24 reporting to me. And I was the person responsible
 25 for making sure that they had the on board

1 procedures correct directly from training. I had
 2 to do check flights periodically with them. I had
 3 to be aware of all policies and procedures that
 4 flight attendants worked under. I was the person
 5 responsible for having performance discussions with
 6 flight attendants. I had to interpret policy to
 7 flight attendants.
 8 So I really had to know everything about
 9 what a flight attendant was supposed to do because
 10 I was their point of contact for answering
 11 questions and reviewing performance.
 12 Q. In that position, as a supervisor of
 13 flight attendants, did you have occasion to review
 14 flight attendants' personnel records?
 15 A. Yes, I did. If I were going to have a
 16 performance discussion with a flight attendant or
 17 even if I were going to talk to a flight attendant
 18 about good performance, I would have to have a feel
 19 for what the person was all about. So I would do a
 20 thorough file review so that I could have a more
 21 learned discussion with the person.
 22 Q. What did that require you then to know
 23 about TWA?
 24 A. It required me to know about all of the
 25 policy and procedures that related to flight

1 attendant work so that I could interpret what I was
2 looking at. And even more importantly, so I could
3 explain it to the flight attendants.

4 Q. Would that include leave records, for
5 example?

6 A. Yes, that would include leave records,
7 any other kind of attendance reports; literally
8 anything that related to their work.

9 Q. Are you familiar with the term butterfly
10 leave?

11 A. Yes, I am.

12 Q. Can you tell us what that means?

13 A. A butterfly leave was the name given to
14 company-offered leave of absences for time in
15 excess of 30 days.

16 Q. In the position that you held above
17 flight attendants, if a flight attendant requested
18 butterfly leave, who would that request go to?

19 A. It would go to the domicile manager of
20 administration.

21 Q. Is that a position that in your career
22 you eventually supervised?

23 A. Yes, I did supervise that position.

24 Q. If I recall what you told me, you said
25 you left this position as supervisor of flight

1 The flight attendant would be responsible for
2 knowing and doing on the airplane.

3 Q. And how long did you hold the position of
4 staff analyst?

5 A. Until 19 -- let's see 1976, 1977.

6 Q. And after that what position did you hold
7 with TWA?

8 A. After I was a staff analyst, I went to
9 Chicago as manager of flight attendants. I'm
10 sorry, '74 to '76. Then I went back as a manager
11 of flight attendants in '76 to Chicago.

12 Q. All right. And what did the job of
13 manager of flight attendants in Chicago -- what did
14 that job entail?

15 A. Well, in the manager flight attendants
16 position, I supervised the supervisors of flight
17 attendants, you know, the job that I had of
18 supervisors, well, I had about I think it was 10
19 people that did what I used to do. I apprised
20 them.

21 So I had responsibility for training
22 them, for insuring that now they knew all of the
23 policies and procedures, that they knew the
24 philosophy, that they knew exactly what to look for
25 when doing performance evaluations on board the

1 attendants in 1974?

2 A. Yes, I did.

3 Q. And can you just kind of describe for us
4 what happened after that, where did you go in TWA?

5 A. Well, I went to New York in 1974 as a
6 staff analyst for inflight services, that is
7 corporate head quarters.

8 Q. What were your job responsibilities as a
9 staff analyst at inflight services?

10 A. Well, as a staff analyst I was
11 responsible for writing serving procedures, you
12 know, the food and beverages that are served on the
13 aircraft. Well, for the sake of consistency with
14 the service, you have to give explicit guidelines
15 and directions in the form of bulletins to the
16 flight attendants, so that he or she would know
17 that, you know, this is what one does first and
18 second, et cetera, on the aircraft.

19 And we all -- I was responsible for
20 writing then a newsletter that we started called,
21 On the Line. And that was another communication
22 device that was sort of a summary of all of the
23 changes occurred like a thumbnail sketch of not
24 just inflight services procedures, but any other
25 kind of things that impacted the flight attendant.

1 aircraft.

2 So I was responsible now to insure that
3 these people knew all of the job performance duties
4 and all of the administrative duties. And all of
5 the accountabilities among flight attendants.

6 Q. Approximately, if you recall, how many
7 flight attendants would have been involved when you
8 were in that position?

9 A. I believe I had about 1,000 flight
10 attendants reporting to me through those 10
11 supervisors.

12 Q. Did you continue with TWA after that?

13 A. Yes, I did.

14 Q. What position did you hold?

15 A. Well, in 1977 I became the regional
16 general manager of the St. Louis domicile.

17 Q. How long did you hold that position?

18 A. I held that position until 1986.

19 Q. And can you tell me, what did that
20 position involve on a day-to-day basis?

21 A. Well, as regional general manager of the
22 St. Louis base I was now responsible for all of the
23 administrative functions now, the leaves that we
24 talked about earlier, the leaves administration,
25 the supervisors of flight attendants, the overall

1 job that flight attendants did on board the
2 aircraft, the budget associated with the people and
3 everything else that made up that domicile base.
4 And just general the well-being of the flight
5 attendant group and the job that they did at that
6 base, everything.

7 MS. WEINSTEIN: Excuse me, Judge, one of
8 the jurors has indicated for a drink.

9 THE COURT: Do you need to be excused?

10 I thought I heard someone coughing and
11 every time I looked over I couldn't tell who
12 it was. I'm sorry, if you need to take a
13 break at any time, just let us know.

14 THE COURT: Okay, go ahead.

15 BY MS. TEDDER:

16 Q. Let's see. Could you tell us, you held
17 that position until 1986?

18 A. Until 1986, yes.

19 Q. And you continued to work for TWA,
20 correct?

21 A. I continued to work for TWA. In 1986 I
22 went back to New York as the staff vice-president
23 of inflight services.

24 Q. And what would your job responsibilities
25 as a staff vice-president for inflight services

1 Q. You held that position until when?

2 A. Until 1991.

3 Q. And what did you do after that?

4 A. The next job was staff vice-president of
5 customer relations.

6 Q. And can you tell us briefly, what did
7 that position involve?

8 A. Well, I was the liaison between the
9 customer and the company basically, the people that
10 flew on the planes and the company.

11 Q. How long did you hold that position?

12 A. Until 1995.

13 Q. After 1995 what did you do for TWA?

14 A. In 1995 I became the vice-president of
15 inflight services.

16 Q. It was vice-president of inflight --

17 A. Inflight services.

18 Q. What did you do in that position?

19 A. Anything and everything to do with flight
20 attendants and on board services. I was
21 responsible for the selection and the training and
22 the overall performance and the head count and the
23 management through the domicile managers for the on
24 board services that I talked about earlier, for
25 devising those services.

1 have been?

2 A. As staff vice-president of inflight
3 services I was responsible for developing the food
4 and beverage service that TWA served on its
5 flights. Responsible for actually working
6 collaboratively with the cabin crew and every other
7 department to make sure that the food and beverage
8 service met TWA's marketing and other needs. I was
9 responsible for how it was packed, the order of
10 service in serving it. The contracts that we got
11 the stuff from for the food and beverage service.
12 The movies that went on the aircraft and where the
13 movie bags were stowed, et cetera, et cetera.

14 It was -- if it was an ongoing service I
15 was held responsible for it.

16 Q. And you said you worked collaboratively,
17 I think you said with the cabin crews, correct?

18 A. Well, correct. Because it wouldn't do
19 any good to develop a service that couldn't be
20 done. So instead of just developing it in a
21 vacuum, you worked with representatives of the
22 people who were actually going to do it.

23 Q. And that would include representatives of
24 the flight attendants?

25 A. Yes.

1 Then again, it's something that you have
2 to work collaboratively with a bunch of different
3 stakeholders in process in order to do it.

4 Q. You talked about training, you didn't, in
5 that position as corporate vice-president, didn't
6 actually train the flight attendants yourself;
7 would that be correct?

8 A. No. I was responsible for that training,
9 I did that through a director manager of training.

10 Q. All right. Now, you told us you retired
11 in 1999?

12 A. Yes.

13 Q. And you said that's 31 years with TWA?

14 A. That's 31 years, yes.

15 Q. Can you tell us how many of the 31 years
16 that you worked for TWA were you focused on either
17 some type of training, supervisor, managing or
18 directing of the flight attendant?

19 A. Well, except for the period from 1991 to
20 1995 when I was in customer relations, and the '68,
21 '69 period when I was actually a flight attendant,
22 every other aspect of my career dealt with flight
23 attendant work.

24 Q. All right. Can you tell us what you were
25 asked to do in this case?

1 A. Yes. I was given a number of personnel
2 records and flight logs and asked to look at them
3 and analyze them, interpret them and tell your
4 company basically what they said.

5 Q. Can you tell us what did you review to
6 accomplish that?

7 A. Well, yes. I had actual flight logs for
8 some period. And I had attendance records. I had
9 company-offered leave records. I had personal
10 time-off records, for instance, I had illness
11 records. I had some training records. I had some
12 vacation records. I had some customer
13 commendations.

14 Q. I am going to show you two exhibits, one
15 of which has already been admitted.

16 Defendants' Exhibit 1950, which is the
17 TWA personnel records of Ms. French. You might
18 want to just take a quick gander through those.
19 Let me hand you those.

20 I'm also going to hand you Defendants'
21 Exhibit 2030 and Defendants' Exhibit 1957, which
22 are the TWA flight logs. And I just want you to
23 take a minute and look through both of those and
24 I'm going to ask you if those are the records you
25 reviewed and then I'm going to ask you what you did

1 Q. I want to talk generally for a few
2 minutes about the work schedules that flight
3 attendants have. There's been some testimony in
4 this case about that.

5 Can you tell us, based upon your
6 experience, how many hours a month does a TWA
7 flight attendant work on average on the aircraft?

8 A. Well, on the aircraft on average a flight
9 attendant works between 68, 75 hours on the
10 aircraft.

11 Q. Is that called block time?

12 A. Block time.

13 Q. So in the course of a year, how many
14 hours does a flight attendant, on the average, how
15 many hours is she on the plane?

16 A. Well, I'll choose the high side, the 75
17 hours, so that there's benefit of the doubt built
18 in. On a 12-month basis, if a flight attendant
19 flies 75 block hours over a 12-month period, he or
20 she would fly, I think it's about 900 block hours.

21 Q. And on the average, how many days per
22 month does the flight attendant work on the
23 airplane?

24 A. Well, a flight attendant work month
25 averages between 14, 16 days a month.

1 in this case.

2 A. Now, clearly I haven't looked at every
3 page here, but I have looked at a sampling and
4 based on the sampling that I looked at, yes, these
5 are records I worked with.

6 Q. You've also been handed the TWA flight
7 logs, which are --

8 THE COURT: If you want to put something
9 up here, you can. Let me just move this.

10 THE WITNESS: Thanks.

11 BY MS. TEDDER:

12 Q. Do Defendants' Exhibit 2030 and 1957
13 comprise of flight logs that you looked at in this
14 case?

15 A. Yes, these look like the flight logs.

16 Q. What period did the flight logs that you
17 looked at encompass?

18 A. The flight logs that I received covered
19 the period from July 1994 through, I believe it's
20 November 2001.

21 Q. Because you spent so much time at TWA and
22 because Ms. French worked at TWA I'm going to ask
23 you, did you know Ms. French while you were at TWA?

24 A. No, I'm sorry, I don't remember. I don't
25 remember having met her.

1 Q. And again, using that assumption over the
2 course of a year, what's the average number of days
3 that a flight attendant will work?

4 A. Well, I'm going to take the high number
5 this time also, 16. And applying 16 days a month
6 on average, times 12 months in a year, that's 192
7 days a year that a flight attendant on average
8 works.

9 Q. Ms. Coleman, are you aware of the various
10 restrictions on smoking that have been put in place
11 over the years?

12 A. Yes, I am.

13 Q. On aircraft?

14 A. Uh-huh.

15 Q. Can you tell the jury when TWA first
16 began to limit smoking on its domestic flights,
17 flights in the U.S.?

18 A. Well, I think it was April of '88 TWA
19 instituted a ban on smoking for all flights two
20 hours and under.

21 Q. And at some point in time did that
22 change?

23 A. Yes. It changed February, toward the end
24 of February, I think it was about February 25 of
25 '90. Then flights of six hours or less smoking was

1 banned on those.
 2 Q. When the ban on flights six hours or less
 3 was implemented, how did that affect TWA's domestic
 4 flights?
 5 A. Well, that meant that in effect smoking
 6 was banned on all TWA flights, except St. Louis to
 7 Hawaii, that is over six hours.
 8 Q. That was over six hours?
 9 THE COURT: Where to Hawaii?
 10 THE WITNESS: St. Louis.
 11 BY MS. TEDDER:
 12 Q. From your review, did you understand that
 13 Ms. French flew that particular route?
 14 A. Well, I didn't see any evidence of it in
 15 the record. And when I read through a deposition,
 16 I think Ms. French flew Los Angeles/Hawaii.
 17 Q. And that was under six hours?
 18 A. That was under six hours.
 19 Q. Smoking would have been banned on that
 20 flight?
 21 A. Yes.
 22 Q. You talked earlier that the flight
 23 attendant has about a 68 to 75 hours a month of
 24 block time; do you recall that?
 25 A. I'm sorry, I didn't hear.

1 Q. You said earlier that the average flight
 2 attendant works about 68 to 75 hours a month block
 3 time?
 4 A. Yes, I did.
 5 Q. How does block time compare to time in
 6 the air?
 7 A. Well, block time is the time the flight
 8 attendant is on the airplane beginning when you
 9 move away from the gate, move away from the loading
 10 gate and until the time it parks at the station
 11 where you're going. Everything in there is block
 12 time. That includes the taxi on the beginning of
 13 the trip and the taxi on the end of the trip. So
 14 the time in the air would obviously be less than
 15 that.
 16 Q. From your review of the records in this
 17 case, the records that you told us you reviewed,
 18 have you been able to determine the block time for
 19 any period of time which Ms. French flew for TWA?
 20 A. Yes, the records that I mentioned
 21 earlier, July 1994 through November 2001, that is a
 22 flight time record for each month. It's separated
 23 by months, July, August, September, October,
 24 November, December, for instance, in 1994.
 25 And in each year there is a flight time

1 record for each month. And that's what I reviewed.
 2 And that has on it the block times of each flight.
 3 And then at the bottom it has a summary and a total
 4 of the block times for that month.
 5 Q. All right. Were you able to determine
 6 from your review of the records the average block
 7 time for the flights Ms. French flew between 1994
 8 and 2001?
 9 A. Yes.
 10 Q. Can you tell us, how did you do that?
 11 A. Well, remember there is a flight time
 12 record for every month. And there's a total at the
 13 end of the listing.
 14 So let's start at the beginning, let's
 15 start with 1994. 1994 you have July, you have a
 16 total block time, block hours. August, you have a
 17 total of block hours flown and in hours and
 18 minutes. You have the same thing for September,
 19 October, November, December. And there is a total.
 20 There's six months that you're covering in 1994.
 21 So in order to take the average, you take
 22 all of the time, the total of all of the block
 23 hours flown, you have six months time that they
 24 were flown in, so you divide whatever that total is
 25 by 6 and now you have an average, an average of all

1 of the block hours flown on a monthly basis because
 2 you've divided by the total months covered.
 3 So that's what I did for '94, '95. I had
 4 started in January and went through December, so I
 5 did the same thing for every month, added them up,
 6 there is the total. You've got 12 months. You
 7 divided by 12 and whatever that answer is is
 8 average.
 9 Q. Have you prepared an exhibit today to
 10 show what outlines what you found?
 11 A. I did prepare it, yes.
 12 Q. Would it assist your testimony today to
 13 take a look at that?
 14 A. Yes, it would.
 15 THE COURT: Either you can step down or
 16 is there a smaller version that you can give
 17 to the witness?
 18 MS. TEDDER: I don't think I have a
 19 smaller version.
 20 THE WITNESS: Could you put it over here?
 21 MS. TEDDER: The jury can't see it if you
 22 put it over there.
 23 BY MS. TEDDER:
 24 Q. Now, I see that we have years at the
 25 bottom '94 through 2001, 0 through 80 at 75 average

1 block hours.
 2 Can you tell us, Ms. Coleman, what are we
 3 looking at with this chart?
 4 A. Sure. Remember I said we would just get
 5 the high side of the average, 75 block hours is
 6 what a flight attendant would fly in a given month.
 7 So this 0 to 80 here just is the scale that says,
 8 okay, you know, 75 average block hours. And
 9 remember 1994 we had six months worth of data. So
 10 based upon the flight logs directly from the flight
 11 logs there's an entry, there's a sum total of hours
 12 for July. There's one for August, September, et
 13 cetera, et cetera, et cetera.
 14 So you add them up and you divide them by
 15 six. And 54 hours and 9 minutes represents the
 16 average block hours for each of those six months.
 17 Q. So for 1994 the average was 5409 a month?
 18 A. Yes.
 19 Q. Average hours per month. For 1995, her
 20 average was --
 21 A. Fifty-six hours and 35 minutes.
 22 Q. And 1996?
 23 A. It was 58 --
 24 THE COURT: That might help you. I don't
 25 know, but...

1 MS. TEDDER: Thank you, very much.
 2 THE WITNESS: Fifty-eight hours and 57
 3 minutes. And for 1997 59 hours and 47
 4 minutes.
 5 BY MS. TEDDER:
 6 Q. Again, that's the average?
 7 A. This is the average. It is adding up all
 8 of the block time for each month for which we have
 9 data, which here it's mostly for 12 months.
 10 You add it up and then you divide by 12
 11 and you get the average for each month. And so on.
 12 Seventy-three hours and 21 minutes for
 13 1998. Fifty-two hours and 30 minutes for 1999.
 14 Sixty-seven hours and 2 minutes for 2,000. And 47
 15 hours and 22 minutes for 2001.
 16 Q. I think you can take the stand again.
 17 And you can keep your pointer because you may need
 18 it.
 19 Does this graph fairly and accurately
 20 depict the average block hours for Ms. French
 21 between 1994 and 2001?
 22 A. Yes, they're taken directly from the
 23 flight logs.
 24 Q. I want to turn and talk now about the
 25 period 1976 to 1990. You told us you did not have

1 flight logs for that period; is that correct?
 2 A. That's correct, I didn't.
 3 Q. What were you able to review for the
 4 period 1976 to 1990?
 5 A. Well, I had various attendance records
 6 for that period. I had, for instance, I had
 7 company offered leave records. I had personal time
 8 off records. I had some records of vacation taken.
 9 I had some training records. I had illness
 10 records.
 11 So I was able to look at those records
 12 and simply determine the periods of time when
 13 Ms. French was other than on an airplane.
 14 Q. And is that what you did; can you just
 15 tell us briefly what you did with those records
 16 when you looked at them?
 17 A. Well, yes, I separated them by year. And
 18 I looked at each record that I had to see what was
 19 it saying, if it was a company offered leave
 20 record, I looked at the dates that the leave was
 21 offered and I wrote down the total number of days
 22 on leave. And I put that down. And then if there
 23 was something that said, okay, Ms. French was ill
 24 for these number of days, then I wrote that down in
 25 the total.

1 And if she was on personal time off, I
 2 looked at and said, okay, for these number of days
 3 and I wrote that down. And so on and so forth. If
 4 there was an indication that there was vacation,
 5 then I wrote that down. Understand this is by
 6 year, 1976, '77, '78, '79, et cetera.
 7 So at end of all of that I just added up
 8 all of the numbers for each year.
 9 Q. And did you that for each year between
 10 '76 and 90?
 11 A. Yes, I did.
 12 Q. Have you prepared an exhibit to show the
 13 jury the time that Ms. French was other than on the
 14 aircraft between '76 and 90?
 15 A. Yes.
 16 Q. Let's take a look at that.
 17 You may need to come down again,
 18 Ms. Coleman, because I'm going to ask you to tell
 19 us what it is we're looking at.
 20 I see 0 to 365 on the right-hand side of
 21 this chart. I see years '76 through '90 at the
 22 bottom. So if you can just basically tell us what
 23 it is that this chart encompasses.
 24 A. Well, this is just 365 days in a year.
 25 So that is the maximum number of days that

1 obviously that one could be available for any day
2 in a calendar. That's what that number represents.

3 Remember I added up all of the days that
4 I could figure out from the records for each year.
5 And these were simply days that Ms. French was
6 doing something that would have kept her from being
7 on a plane.

8 For 1976, when I added up all the days,
9 it was 35. In 1977 when I added up all the days,
10 it was 46. In '78 it was 156. In '79 it was 225.
11 In '80 it was 218.

12 Q. For each year?

13 A. Just for each year, just methodically
14 going through and adding them up.

15 Q. I see two years in here that are slightly
16 different than the others, one is 1976 and the
17 other is 1990.

18 And I see, for example, 1976 we have a
19 dotted line going down and a 173 over here; what
20 does this tell us about 1976?

21 A. Well, Ms. French couldn't have been
22 available until she came on line as a flight
23 attendant on June 10th. So that reduces the number
24 of days that she would have been available to do
25 anything, because that represented when her work as

1 Remember earlier you asked how many days
2 a flight attendant works a month? And I said
3 between 14 and 16. Again, I took the high number,
4 I said 16 days.

5 So if a flight attendant is working on
6 average 16 days a month, when you multiply that
7 times 12, you come up with something where he or
8 she would reasonably be working is less than 365.
9 That 16 times 12 is 192. So 192 represents on
10 average the number of days that a flight attendant
11 would be doing something on a plane.

12 Q. Is there any way using the information
13 that you had that you were able to construct a
14 flight attendant year? For example, using this
15 chart and the information you have from the TWA
16 records is there any way that you could construct a
17 flight attendant year of 192 days for Ms. French?

18 A. Well, yes. Because it's instead of being
19 a 365-day year, you're now working with 192 days.
20 But, you know, there's another side to it, also,
21 because if a flight attendant works on average 16
22 days a month, there are some blocks of time that
23 are included here when, in fact, Ms. French was
24 doing other than on the aircraft. But had she not
25 been on a leave during those 30 consecutive days

1 a flight attendant started or when she could have
2 been available for anything having to do with a
3 flight attendant.

4 So the 365 is brought down to 173 from
5 June 10 forward.

6 Q. So out of the 173 days, she wasn't there
7 35 is what you're telling us?

8 A. Yes.

9 Q. What about 1990; what does that
10 represent?

11 A. Well, this is two months. Because there
12 was a ban on smoking on all applicable segments as
13 of this date. So I just stopped it. And that was
14 just 56 days of availability 1990. And the 13 out
15 of 56 would have been the number of days that she
16 was doing something else and couldn't have been on
17 a plane.

18 Q. All right. Now, let's talk about the 365
19 days. You may want to stay here, we're going to
20 talk about a couple of things real quick.

21 But how many days out of 365 does a
22 flight attendant work?

23 A. Well, a flight attendant doesn't work 365
24 days out of a year. Very few people do work 365
25 days out of a year.

1 within a given month, she wouldn't have worked
2 those 30 days anyway. Because the average is 16
3 days.

4 Q. And so what have you done with these
5 numbers to reflect that?

6 A. Actually, I reduced the number of days
7 unavailable to work commensurate with the idea that
8 flight attendants don't work 30 days. So if they
9 take 30 days off, the company wouldn't have had
10 them for about 16 of those days.

11 So I converted those 30-day blocks of
12 time, I took them and reduced them down to 16 days.

13 Q. Have you prepared an exhibit that
14 reflects that?

15 A. Yes, I did.

16 Q. Now, we have the same green columns, but
17 I see orange columns in here. And I see an orange
18 line. Can you tell us what this chart now
19 reflects?

20 A. Yes. See, remember, the green bars here
21 represent just raw numbers. You see the number,
22 here's the number just as it is. But it would be
23 sort of unfair to say, well, Ms. French wasn't
24 available for 30 days in this block when the
25 company would only have used her services for

1 about, on average 16 of those days.
 2 So I reduced the green bar numbers down
 3 to the extent they contained those 30-day blocks
 4 within a month. I took 30-day blocks and I changed
 5 the number to 16. Because it more accurately
 6 reflects a time of unavailability. So the orange
 7 bars that you see here represent the reduced down
 8 numbers to take the flight attendant year of 192
 9 days into consideration.
 10 Q. All right. And from these orange bars
 11 can you determine from those how many days from
 12 1976 to 1990 that Ms. French would have been
 13 available to work?
 14 A. Yes.
 15 Q. How do you do that?
 16 A. You see, this is 1978 as a for instance.
 17 When you reduce this raw number down to more what a
 18 flight attendant's world would look like, you see
 19 99 days that she was doing something that would
 20 have kept her from being on the airplane. Well,
 21 when you say to me, well, what could she have
 22 worked, you just look at 192 and you separate --
 23 subtract 99 from 192 and whatever that answer is,
 24 that's what she would have been available to work.
 25 Q. Did you make those calculations for each

1 of the years between 1976 and 1990?
 2 A. Yes, I did.
 3 Q. Have you prepared a chart that reflects
 4 that?
 5 Put this one down for just a minute.
 6 Can you tell us, Ms. Coleman, what does
 7 this particular chart reflect?
 8 A. Well, this chart is really sort of the
 9 reverse of this one.
 10 Q. I'll hold this one up.
 11 THE COURT: Can you show it to me for a
 12 minute?
 13 MS. TEDDER: Sure.
 14 THE WITNESS: Well, let's take a year.
 15 I'll go with what I can see here.
 16 Let's take, here's a year, 1984. See
 17 here in 1984, when you reduce this 112 down to
 18 take account of the shorter availability that
 19 you would expect of a flight attendant in '84,
 20 remember I said on this line represents on
 21 average what a flight attendant works in terms
 22 of days during the year. If you take 84 from
 23 192, you should come up with 108.
 24 So now this represents on average the
 25 number of days of availability, which is just

1 the opposite of the number of days when a
 2 person is doing something that would keep them
 3 off the plane.
 4 BY MS. TEDDER:
 5 Q. So for the year 1979, for example, there
 6 were 61 days she could have been available to work?
 7 A. Could have been able.
 8 Q. For 1980 I see 69 days?
 9 A. Yes.
 10 Q. For '83 I see 90?
 11 A. Yes.
 12 Q. For 1982 I see 55?
 13 A. Exactly.
 14 Q. So if you do the same thing --
 15 A. This is the arithmetic, the difference
 16 between the orange bar numbers and 192.
 17 Q. I see that the years again, 1976 and
 18 1990, are different and they're different for the
 19 same reasons that you explained before?
 20 A. Exactly, because you couldn't reasonably
 21 expect somebody to be available before they came to
 22 work. And it doesn't matter after this because
 23 smoking was banned.
 24 Q. You can probably take your seat again.
 25 Again, you started today talking to us

1 about block time; do you recall that?
 2 A. Yes. Yes, I do.
 3 Q. And you talked about 68 to 75 hours,
 4 block hours average a month; is that correct?
 5 A. Yes, I did.
 6 Q. And we took a look at the chart that you
 7 showed us earlier that had block time between '94
 8 and 2001; do you recall that?
 9 A. Yes, I do.
 10 Q. Now, is there any way to figure out from
 11 these charts that you've shown us, these charts
 12 with the days, for example, the one we just looked
 13 at days of availability between '76 and 1990, these
 14 are days, but you were talking to us before about
 15 block hours. Is there any way to convert these
 16 days into hours?
 17 A. Well, yes. Remember we're talking about
 18 averages. And remember I was always taking the
 19 high side of the average. And I'd like to stay
 20 consistent with that.
 21 On average, let's take 75 block hours a
 22 month. And on average a flight attendant works,
 23 comes to work 14 to 16 days, but let's go with 16.
 24 If, in fact, a flight attendant is flying
 25 on average 75 hours during 16 days, then if one

1 divides 75 by 16, the answer will give you on
2 average what the flight attendant is working each
3 of those 16 days.

4 Q. Or what she could have been available to
5 work?

6 A. Or what she could have worked,
7 understand, this is what she could have worked.
8 Using the average value for block hours per month,
9 which is 75, and days worked a month, which is 16.

10 Q. Did you, in fact, make that calculation
11 for each of the years reflected on your chart
12 between 1976 and 1990?

13 A. Yes, I did.

14 Q. And did you bring that exhibit to show
15 the jury?

16 A. Yes.

17 THE COURT: Could you show it to me
18 before it's up?

19 BY MS. TEDDER:

20 Q. You can come down and kind of tell us
21 what this chart represents, how many hours, what
22 does it represent?

23 A. Well, remember --

24 Q. The purple chart with the days.

25 A. Remember I said that this represents the

1 Q. And the same with -- so you've done that
2 for each year. For '76 I see 390 potential block
3 hours?

4 A. Potential block hours based upon the days
5 in the purple cart.

6 Q. Purple chart.

7 A. The same thing for each year. For each
8 year you look at the purple cart and you see, okay,
9 so how many days could Ms. French have been
10 available to work, multiply that times the average
11 value a day of 4.7 block hours and you end up with
12 these figures that's at the top of these blue bars.

13 Q. So for the year 1980 you have total of
14 277 block hours that she could have been available?

15 A. Right. That would be 4.7 times whatever
16 days that she could have been available because she
17 wasn't doing something that kept her off the
18 airplane.

19 Q. And 1982 I see 729 block hours?

20 A. Yes.

21 Q. And you've done that for each year and
22 that's what that graph depicts?

23 A. That's what it says.

24 Q. Okay. I have just a few more questions
25 and I think you could probably take the stand again

1 average number of days that Ms. French could have
2 been available for work here. Let's say 1977 it
3 was 146 days. We're trying to be consistent
4 talking about a block-hour concept. Well, when you
5 look at the average number of block hours flown a
6 day -- is it possible to write? I don't want to
7 mark these up. That's okay, I'll do it. That's
8 all right.

9 If you divide the 75 total block hours
10 for the month by the 16 days worked during the
11 month, what you come out with is 4.68 that I
12 rounded up to 4.7. That would be 4.7 block hours
13 for each of those 16 days. And wound up with 75.

14 Q. All right.

15 A. Now, back to the year, '78 I think it
16 was.

17 If you look at 1978 you see 93 days that
18 Ms. French could have been available to work. For
19 each of those 93 days that she could have been
20 available to work, we determined that on average a
21 flight attendant works 4.7 block hours per day
22 worked. If you multiply 4.7 times the 93 and that
23 was '78, I think, you end up with 437 block hours
24 as the block hours that Ms. French could have
25 worked.

1 for those.

2 I notice that you have been telling us
3 this afternoon about hours that she -- block hours
4 that she could have been available, correct?

5 A. That's correct.

6 Q. And you're not saying that she actually
7 was available for all this time, correct?

8 A. No, because I don't know.

9 Q. In your opinion, you based this on a 75
10 block hour month, correct?

11 A. Yes.

12 Q. And in your opinion and based upon your
13 review of the records, could Ms. French actually
14 have had less block hours?

15 A. You mean that the average value --

16 Q. Yes.

17 A. -- could have, because these are
18 averages.

19 Q. And when you looked at her actual block
20 hours earlier, the actual block hours that you had
21 between '94 and 2001, that was less than 75,
22 correct?

23 A. The average block hours per month was
24 less than 75, yes.

25 Q. In fact, that averaged approximately

1 what?
 2 A. Oh, I recollect it was about 58 hours of
 3 block hours.
 4 Q. And you have reviewed Ms. French's
 5 employments records, correct?
 6 A. Yes.
 7 Q. And can you tell us how did the number of
 8 days that Ms. French took off for leave, vacation,
 9 et cetera, between 1976 and 1990 when the six-hour
 10 ban went into place, how did those leave hours
 11 compare with '94 through 2001?
 12 A. Well, Ms. French took most of her leave
 13 time between 1983 and earlier, much, much, much
 14 less, almost I think no leaves after that. After
 15 '83.
 16 Q. What does -- I think that would be
 17 after -- what does that tell you then about her
 18 block hours during 1976 to 1990, if she was on
 19 leave a lot; what does that tell you about the
 20 block hours that she could have worked?
 21 A. Well, logically I would expect them to be
 22 less.
 23 Q. Less than your calculation of 75 hours?
 24 A. Yes, less than my calculations.
 25 MS. TEDDER: I think that takes care of

1 forgot something on this chart.
 2 We were looking at this blue chart, and
 3 you may need to step down again, Ms. Coleman. I'm
 4 sorry.
 5 This blue chart that we looked at went
 6 from June 10th, '76, it actually went a little bit
 7 further than the other charts we looked at, it went
 8 through August 31st of 1995?
 9 A. Yes.
 10 Q. So you have some calculations down here
 11 from '91, '92, '93, '94 and '95?
 12 A. Yes.
 13 Q. We didn't talk about those. Can you tell
 14 us what that reflects?
 15 A. Well, in effect smoking was banned on
 16 domestic after, oh, February 25th of 1990. So I
 17 looked at or tried to assess what was happening
 18 then in terms of Ms. French's record of flights on
 19 the international side where smoking was still in
 20 effect. I read in Ms. French's deposition that she
 21 flew about one international trip a year. And then
 22 when I looked at the flight logs I saw that that
 23 was about right.
 24 So I then looked at, okay, if Ms. French
 25 was going to fly about one international flight a

1 my questions. Thank you.
 2 THE COURT: Cross examination.
 3 CROSS EXAMINATION
 4 BY MR. TROP:
 5 Q. Afternoon, Ms. Coleman. My name is Adam
 6 Trop. We haven't met before. I represent Lynn
 7 French.
 8 I have a couple of questions for you.
 9 A. Okay.
 10 Q. You mentioned you're retired now from
 11 TWA?
 12 A. Yes.
 13 Q. And you retired when the new management
 14 came in in '99?
 15 A. Actually the new management came in a
 16 little after that. I retired --
 17 MS. TEDDER: I'm sorry, there's one -- I
 18 had just a couple more questions that I
 19 actually forgot. And I'm terribly sorry.
 20 THE COURT: Do you mind? We'll get right
 21 back to you.
 22 MR. TROP: That's fine
 23 DIRECT EXAMINATION (CONTINUED)
 24 BY MS. TEDDER:
 25 Q. I'm sorry, I just realized I forgot. I

1 year, let me look at the longest international
 2 flight.
 3 Q. That she actually flew?
 4 A. Well, that she actually flew, yes, that
 5 she actually flew.
 6 Q. In the records you had?
 7 A. Just in the records that I had. I just
 8 looked at the block hours on those records. And I
 9 think that flight was Tel Aviv or Athens. And I
 10 took the numbers right off the flight log. And I
 11 said one flight segment.
 12 Let's look at the number of hours that
 13 that would entail. And that's why you see the 22,
 14 22 and the 22. I had actual records for July
 15 through December of 1994. So I added up the flight
 16 hours for the international segments and that's
 17 where I got the 73 from.
 18 Q. And '95 you also had an actual flight log
 19 to look at?
 20 A. I had an actual flight log and that's
 21 what that is.
 22 MS. TEDDER: All right. Thank you.
 23 And again, I apologize.
 24 THE COURT: Mr. Trop.
 25 CROSS EXAMINATION (CONTINUED)

1 BY MR. TROP:

2 Q. Ms. Coleman, again, my name is Adam Trop.
3 We met about three minutes ago, I guess, old
4 friends now.

5 Since you've retired from TWA, I
6 understand you, one of the things that you do is
7 you're -- I don't know if I'm using the right term,
8 motivational speaker or a paid speaker?

9 A. Yes.

10 Q. And the tobacco companies have of course
11 hired you to render testimony in this case, right?

12 A. Uh-huh.

13 Q. And they've -- you've worked on other
14 cases for the tobacco industry, haven't you?

15 A. Yes.

16 Q. I think the Fontana case that they hired
17 you on?

18 A. Yes, the Fontana case.

19 Q. You didn't testify in trial in that case?

20 A. No, I didn't.

21 Q. Do you recall what they paid you just to
22 render your opinions in the Fontana case?

23 A. Yes, I do.

24 Q. Can you approximate for the jury?

25 A. The rate is \$100 an hour -- you mean the

1 Q. On Fontana and this case?

2 A. No, no, no. On this case.

3 Q. Times 100, right?

4 A. Uh-huh.

5 Q. And that's not including where we are
6 now?

7 A. No, that's not including today.

8 Q. You flew in from Missouri is it?

9 A. St. Louis.

10 Q. Can you tell us how much you're going to
11 be charging for your testimony here to come to
12 trial?

13 A. Same rate, \$100 an hour.

14 Q. From the time you left Missouri to when
15 you get back?

16 A. Well, I'll get into that as soon as I get
17 back. I imagine so, yes.

18 Q. Are you leaving today or tomorrow?

19 A. Hopefully today.

20 Q. Now, you said you were a flight
21 attendant. I guess that was just -- let me ask
22 you, after that year or a little bit over a year in
23 the '60s, you haven't worked as a flight attendant?

24 A. One or two times since then.

25 Q. One or two trips?

1 total?

2 Q. Yes. Was it about \$7,000?

3 MS. TEDDER: Objection.

4 THE COURT: Just a minute. The
5 objection. What is your objection?

6 MS. TEDDER: I'm sorry, I misunderstood
7 what he said.

8 THE WITNESS: That could -- that could --
9 it sounds right. I don't have the records

10 BY MR. TROP:

11 Q. \$7,000 is about right?

12 A. Uh-huh.

13 Q. In this case I know we've taken your
14 deposition in January, up until that time, I think
15 you had worked about 24 hours on the case?

16 A. That sounds about right, uh-huh.

17 Q. Since January can you tell the jury -- I
18 don't have your bills, sometimes I do. So just
19 tell the jury how much you've worked since then on
20 this case?

21 A. I think it's about 130 hours.

22 Q. 130 --

23 THE COURT: All together or since then?

24 THE WITNESS: All together.

25 BY MR. TROP:

1 A. Since then, yes.

2 Q. You testified earlier you didn't really
3 remember what the conditions were like on the plane
4 when there was smoking?

5 A. I did, yes, in response to Ms. -- yes. I
6 don't remember specifically, you know, given the
7 question that she asked, no. I don't remember any
8 specific kind of thing, yes.

9 Q. So you wouldn't have any reason to
10 dispute that three flight attendants and the pilot
11 that have testified in this case about the
12 conditions?

13 MS. TEDDER: Objection, Your Honor.

14 THE COURT: Sustained.

15 BY MR. TROP:

16 Q. You said you dealt with flight attendants
17 obviously in -- throughout your career, most of the
18 time it was dealing with their union, though?

19 THE COURT: Their what, union?

20 BY MR. TROP:

21 Q. Union representatives?

22 MS. TEDDER: Objection, Your Honor.

23 THE WITNESS: Not really, no.

24 THE COURT: Overruled. It's already
25 answered.

1 BY MR. TROP:

2 Q. I want to go over some of the numbers
3 that I have here and I probably won't do it as
4 effectively as Ms. Tedder did. Let me see which
5 one I like the best.

6 Well, like this one here, the green one.

7 A. Okay.

8 Q. Let me just hold it. I'm not going to
9 use it that long. You're basing this on 75 average
10 block hours?

11 A. No, no, no. On this chart I had actual
12 flight time logs. The official document that tells
13 you the number of block hours before each segment
14 flown and in total by month.

15 Q. But I see here you've got 75 -- what is
16 the average block hours for other flight
17 attendants?

18 A. The average block hours really do
19 oscillate between 65 and 75 block hours. And I
20 chose 75.

21 Q. You also used an estimate, I believe, of
22 between 14 and 16 days a month, the average flight
23 attendant would fly?

24 A. Absolutely. And I chose to use 16, yes.

25 Q. That was going to be my question, because

1 A. Yes.

2 Q. So you can't make the same kind of
3 computations for the previous years; you have to
4 kind of estimate, right?

5 A. That is true.

6 Q. Of course there wasn't smoking on most
7 flights during these years, '94 and on?

8 A. Yes.

9 Q. Except some international flights, all
10 international?

11 A. True.

12 Q. In the previous years in the '70s and
13 '80s when you were estimating her time on the
14 flights, did you take into consideration the many,
15 many years she had when she commuted from
16 California to New York and then started flying?

17 A. I'm not following, say again.

18 Q. In the mid '80s -- well, I should say
19 between -- well, yes, throughout a good portion of
20 the '80s, you read her deposition, you know that
21 she lived in L.A.?

22 A. Yes, I do know that from the records that
23 she lived in L.A.

24 Q. But her home base was in New York, right,
25 remember that?

1 when you take these numbers, both times you took
2 the high, it was between 68 and 75 and between 14
3 and 16, but when you did those calculations, you
4 took the high both times?

5 A. Yes, I did.

6 Q. So your numbers would be pretty different
7 if you took the low or even the true average,
8 right?

9 A. Not really. Because if you're going to
10 say, and I would have to work through the protocols
11 on that, but if you're going to say, because you --
12 I believe you can't take the high of one and the
13 low of the other. If you're going to take 68
14 hours, then you're going to have to take the 14
15 days. If you're going to take the 75 hours, then
16 you take the 16 days. But the numbers -- and I
17 could certainly work through that to see -- but
18 they shouldn't be that radically different in terms
19 of the number of flight hours on average that a
20 flight attendant flies per day since you're dealing
21 with what could have been.

22 Q. You took these numbers, again, these
23 green numbers for 1994 through 2000. And because
24 you didn't have the same kind of record for earlier
25 years, right?

1 A. Yes.

2 Q. So she had to fly from L.A. to New York
3 just so she could start working, right?

4 A. Did I see that she was a commuter, yes.

5 Q. But that's not going to show up on the
6 flight logs, right?

7 A. No, I simply dealt with, you know, her
8 records. I didn't look at -- you're saying --

9 Q. What I'm asking you is on the typical day
10 that she worked through all those years when she
11 flew from L.A. to New York, then did her trip
12 wherever she went for five or six hours or whatever
13 it is, then flew back and then flew home from New
14 York to L.A., you are not taking into consideration
15 the trip from L.A. to New York and from New York
16 back home to L.A.?

17 A. That would be a difficult thing for me to
18 have assessed. Because in the flight attendant
19 world, when one commutes, a number of things could
20 happen. Many flight attendants have what they call
21 the commuter place, so you can't say, well, you're
22 going to go back and forth every time because many
23 try and group their flights so that they don't have
24 to go back and forth. So I really couldn't assess
25 that because I --

1 Q. And that's of course not reflected on
2 your charts?

3 A. It is not, no.

4 Q. So the total air time with all the smoke
5 and, well, all that exposure to tobacco isn't
6 really reflected in your charts for all those years
7 that she had to commute, right?

8 A. Well, I have to say the commute time
9 isn't there. I did see in a deposition that she
10 did commute and she made comment about commuting
11 and the condition of the smoke. And I think she
12 said she tried to sit in the no smoking part of the
13 plane whenever she could.

14 So again, I didn't know what to make of
15 that. And I didn't know how often she commuted
16 because I didn't know if she had a commuter place
17 or not. So, no, I didn't.

18 Q. But the flight time from L.A. to New York
19 is what, about five hours?

20 A. About five hours.

21 Q. So just to make sure we're clear on it.
22 If she flew out of New York, let's say she was
23 flying a six-hour flight somewhere on the job. She
24 would fly five hours from L.A. to New York then get
25 on a plane and do the six-hour flight, have a

1 Q. Did they, when you were making your
2 charts and they were -- you showed them to them I'm
3 sure first?

4 A. Sure.

5 Q. Did they ever tell you, hey, listen,
6 you're missing a whole bunch of hours here when
7 you're making these charts?

8 A. I don't recollect that conversation.

9 Q. Is that how they do their math? I mean,
10 they didn't --

11 MR. REILLY: Objection, Your Honor.

12 THE COURT: Sustained

13 BY MR. TROP:

14 Q. They didn't give you the information you
15 needed to know in order to calculate how many hours
16 of poison she was exposed to?

17 MS. TEDDER: Objection, Your Honor.

18 THE COURT: I'll sustain the objection.

19 But I think it's very clear that you didn't
20 include the commuter time. Okay.

21 THE WITNESS: Because I didn't know it.
22 BY MR. TROP:

23 Q. And you said, I think you said 192 days
24 was the --

25 A. On average, yes.

1 layover, six-hour flight back and then fly five
2 hours home, right?

3 A. Well, see, I don't know that. Because
4 again, I get back to it was impossible for me to
5 assess, you know, was Ms. French, like so many
6 flight attendants that commuted and -- I just don't
7 know.

8 Q. Let's assume that's what it was. Let's
9 assume that's what her testimony was. So that's 22
10 hours in the smoke that I just counted. But on
11 your graphs and charts you're only put putting 12
12 hours, right?

13 A. I'm only putting -- when I'm looking at
14 averages I am working with the numerical averages.
15 And I didn't take those kinds of things that you're
16 mentioning into account, because I had no way to
17 assess an average or anything else because there
18 were too many unknowns.

19 Q. I bet -- you said you worked how many
20 hours on this case, 100 and --

21 A. Oh, about 130 going through all of the
22 records.

23 Q. And I'm sure there are a number of
24 conferences with the tobacco company lawyers?

25 A. Yes.

1 Q. It's really between 168 and 192, right?

2 A. Okay.

3 Q. Let's take your average of 192 days a
4 year that the average flight attendant flies?

5 A. On average.

6 Q. Or 75 hours a month times 12 months,
7 that's about 900 hours a year in there?

8 A. Yes, right. Right.

9 Q. And if you multiply that by, let's say
10 that's the average, multiply that by 14 years,
11 that's 12,600 hours of exposure to tobacco smoke in
12 those small cabins, right?

13 A. I have to admit, you take my computer and
14 a pen and paper and it's hard to follow you.

15 Q. Sound about right?

16 A. Sounds about right.

17 Q. Let's assume 12,600 hours, that comes out
18 to 756,000 minutes of exposure to the tobacco
19 smoke, what the average flight attendant did if you
20 take that over 14 years?

21 A. I'm going to go with your numbers here.

22 Q. You'd be pretty good if you knew that off
23 the top of your head.

24 A. I'm not that good.

25 Q. You said you didn't know Ms. French, you

1 don't remember her. But did you realize that you
 2 had written to her over time?
 3 A. Oh, yes. I did send my letter to
 4 Ms. French, because I had a policy that when flight
 5 attendants worked well with our customers and the
 6 customers commented on how they appreciated the
 7 service, I made it a point to personally thank them
 8 for it.
 9 Q. I think there was actually three letters
 10 that you wrote to her?
 11 A. There could very well be.
 12 Q. All of them were complementing her on her
 13 excellent service to the customers; is that
 14 correct?
 15 A. Absolutely.
 16 Q. And you've got no reason to think she was
 17 anything else but an excellent outstanding flight
 18 attendant?
 19 A. Oh, based upon the record, Ms. French's
 20 ability to work with the customers was excellent.
 21 MR. TROP: Thank you very much.
 22 THE COURT: Is there any redirect?
 23 MS. TEDDER: Just a few questions, Your
 24 Honor.
 25 REDIRECT EXAMINATION

1 BY MS. TEDDER:
 2 Q. Ms. Coleman, Mr. Trop started out by
 3 talking about the time that you spent in this case.
 4 I'm sorry, can you hear me?
 5 THE COURT: When the air conditioning
 6 goes on it's difficult.
 7 BY MS. TEDDER:
 8 Q. Mr. Trop started out by talking about the
 9 time that you had spent in this case, correct?
 10 A. Yes, he did.
 11 Q. Now, can you tell us what -- what did you
 12 spend the bulk of your time in this case on?
 13 A. The bulk of the time was spent going
 14 through page by page of all of the records, the
 15 personnel records that I had. Literally cross
 16 referencing, checking and rechecking, developing
 17 the numbers based upon the records which really
 18 required reading almost every line of every page.
 19 It was extraordinarily time intensive.
 20 Q. In fact, you've only met with me once,
 21 correct?
 22 A. Yes, only once.
 23 Q. So his suggestion that you spent the bulk
 24 of your time meeting with the tobacco people, the
 25 Defendants is incorrect?

1 A. I spent very little of that -- very
 2 little of it was spent with your company.
 3 Q. And you have also given a deposition in
 4 this case, correct?
 5 A. Yes.
 6 Q. And you had to spend some time preparing
 7 for that, correct?
 8 A. Yes.
 9 Q. He also talked to you a little bit about
 10 your -- the fact that you used a 75 hour block
 11 month when you made your calculations; do you
 12 recall that?
 13 A. Yes, I do.
 14 Q. Why did you use a 75 hour block month?
 15 A. I used 75 because I wanted to give
 16 Ms. French the benefit of the doubt in maybe she
 17 flew high time. And that's what that 75 block
 18 translates to.
 19 Q. So you wanted to err on the side of
 20 caution?
 21 A. Yes, absolutely.
 22 Q. And the 12,600 hours that Mr. Trop talked
 23 to you about, that's not representative of
 24 Ms. French's flight time, is it?
 25 MR. TROP: Objection, Your Honor, it's

1 leading.
 2 THE COURT: Sustained.
 3 Don't answer, please.
 4 BY MS. TEDDER:
 5 Q. The 12,600 hours that Mr. Trop talked
 6 about from your review of the records, Ms. French
 7 didn't fly 12,600 hours, correct?
 8 MR. TROP: Objection, Your Honor,
 9 leading.
 10 THE COURT: I think it's leading. It's
 11 suggests the answer.
 12 BY MS. TEDDER:
 13 Q. All right. What did your review of the
 14 block hour time and the records that you had to
 15 review show that Ms. French flew in an average
 16 month?
 17 A. Well, my review showed that Ms. French
 18 couldn't have flown the 900 hours primarily because
 19 per the record, she was engaged in an activity, be
 20 it company offered leave or personal time off or
 21 vacation or training or ill, that would have made
 22 it impossible to be on the airplane and in those
 23 states at the same time.
 24 Q. Was Mrs. French's flight history based
 25 upon your review of the record higher or lower than

1 the average flight attendant?
 2 THE COURT: What do you mean flight
 3 history?
 4 MS. TEDDER: The block hours.
 5 BY MS. TEDDER:
 6 Q. You used a 75-hour average. Was hers
 7 higher or lower?
 8 A. Well, let me put it another, if I might
 9 answer that. Based upon the time that Ms. French
 10 could not have been on the airplane, I'd say it
 11 would be lower than average just because she was,
 12 during a very long period in other than an
 13 available status.
 14 Q. All right, Mr. Trop also talked to you a
 15 little bit about Ms. French's commuter time. Do
 16 you recall that conversation?
 17 A. I do.
 18 Q. And your experience as a supervisor of
 19 flight attendants, as the manager of, general
 20 manager or regional manager of flight services for
 21 TWA, what in your experience does the average
 22 flight attendant do if they're a commuter? Do they
 23 commute every flight?
 24 A. Well, based upon all of the above and my
 25 conversations with a number of commuter flight

1 attendants, what they did was they would fly from
 2 wherever they lived to the place where they were
 3 based. And in these instances Los Angeles flight
 4 attendants flying to Kennedy. And they would get a
 5 shared hotel room someplace relatively close to the
 6 Kennedy airport. And they would try and, I hate to
 7 use the term back to back, you know, you come in
 8 one day, off on one flight and then the next day
 9 you go on another. And get as many of those
 10 flights in a composite --
 11 Q. Time period?
 12 A. -- time period as possible so they
 13 wouldn't have to make the long commute each and
 14 every time.
 15 Q. So in your experience does a flight
 16 attendant fly five hours, take a flight and then
 17 fly back to their home base?
 18 A. In my experience, no, they would not do
 19 that. At least not every time they took a flight.
 20 MS. TEDDER: I think that's it, thank
 21 you.
 22 THE COURT: I think that's it. So thank
 23 you, you're excused.
 24 (Witness excused.)
 25 THE COURT: Who is next?

1 MR. ENGRAM: Your Honor, the defense will
 2 call Ron Sands.
 3 THE COURT: Could you get the witness,
 4 please?
 5 THE COURT: Come forward, please, and the
 6 clerk will swear you in.
 7 THEREUPON,
 8 RODNEY TOBE SANDS
 9 having been first duly sworn, was examined and
 10 testified as follows:
 11 DIRECT EXAMINATION
 12 BY MR. ENGRAM:
 13 Q. Mr. Sands, would you please introduce
 14 yourself to the jury by stating your full name?
 15 A. My name is Rodney Tobe Sands.
 16 Q. And what kind of work do you do?
 17 A. I'm a consulting mechanical engineer. I
 18 do work in the aircraft design industry.
 19 Q. Is there a type of engineering that you
 20 specialize in in the aircraft design industry?
 21 A. Yes, I specialize in environmental
 22 control systems design work.
 23 Q. Could you tell the jury what portion of
 24 your career has been spent designing environmental
 25 control systems used on board aircraft?

1 A. Well, the last 17 or 18 years have been
 2 dedicated to that kind of work.
 3 Q. Would you tell the jury what an
 4 environmental control system is. And occasionally
 5 we may refer to it as an ECS.
 6 A. Yes. The environmental control system is
 7 basically that system on the aircraft which takes
 8 air from outside the airplane when the altitude
 9 compresses the air to a higher pressure, regulates
 10 the pressure and the temperature and then delivers
 11 it to the airplane cabin to produce a safe
 12 breathing environment for the occupants in the
 13 cabin.
 14 Q. So you've talked about this is a system
 15 that regulates the temperature in the cabin; is
 16 that correct?
 17 A. Yes.
 18 Q. And you said that it regulates the
 19 pressure?
 20 A. Yes, that's right.
 21 Q. And is there one other aspect of the
 22 environmental control system that it regulates?
 23 A. Well, the relative humidity, the oxygen
 24 content, those are other factors. There's other
 25 elements, such as particulates that might be found

1 in the cabin are also dealt with by the
2 environmental control system.

3 Q. How does the environmental control system
4 deal with particulates in the cabin air?

5 A. Depending on the specific airplane
6 design, it's dealt with in one of two ways. First
7 of all, for airplanes that do not use recirculated
8 air, the air is simply passed through the airplane
9 one time and the particulates are carried
10 overboard. For airplanes that have recirculation
11 systems on board that fraction that's recirculated
12 is filtered using high-efficiency filters.

13 Q. Okay. Would it be fair for me to
14 characterize then this either the one-pass system
15 or the recirculation system as ventilation?

16 A. Yes.

17 Q. Before we talk about the details of the
18 environmental control system on board commercial
19 airplanes, would you tell the jury a little bit
20 about your background and experience in this field,
21 starting with your education?

22 A. Yes. I have a bachelor of science degree
23 in mechanical engineering and an associate of
24 science degree in electronics engineering, both I
25 received from Oregon Institute of Technology in

1 Q. Can you tell the jury a little bit about
2 the history of Boeing? For example, who built the
3 first -- in terms of the types of aircraft that
4 they build?

5 A. Yes, Boeing started out in the early
6 decades of the 1900s building small wooden,
7 originally wooden aircraft. And then quickly moved
8 kind of to the front of the airplane design
9 industry. And by the middle '50s Boeing was
10 developing the first commercial jet airliner made
11 in this country, the model 707.

12 Q. Has Boeing built just commercial
13 passenger airplanes?

14 A. No, Boeing also builds military
15 airplanes, fighter aircraft, as well as transports
16 and freighter airplanes.

17 Q. You talked about the types of commercial
18 passenger planes that Boeing currently
19 manufactures; did they manufacture any other models
20 prior to the 737?

21 A. Yes. The 727, the 707 were the two
22 primary commercial aircraft models built before the
23 737.

24 Q. How long did you work for the Boeing
25 Company?

1 Klamath Falls, Oregon in 1984.

2 After receiving those degrees, I went to
3 work for the Boeing Company in Seattle, Washington.
4 And within the first year of my employment there, I
5 moved into the environmental control system design
6 group in the commercial airplane division of
7 Boeing.

8 Q. I didn't ask you this, but would you tell
9 the jury where the Boeing Company is headquartered?

10 A. Yes, Boeing is -- the airplane
11 manufacturing segment is headquartered in Seattle,
12 Washington.

13 Q. And where do you live today?

14 A. I live in Oregon.

15 Q. Now, after you graduated, did you tell
16 the jury what year you graduated from Oregon
17 Institute of Technology?

18 A. Yes, I graduated in 1984.

19 Q. And what kind of airplanes does the
20 Boeing Company build?

21 A. Boeing currently builds the 737 model
22 airplane, the 747, 757, 767, triple 7, and now also
23 the 717, which is actually a model that was
24 acquired by Boeing when Boeing bought the McDonnell
25 Douglas Company three years ago.

1 A. A little over 16 years.

2 Q. Let's start from the time that you first
3 went to work for the Boeing Company; what was your
4 job title in the mid 1980s?

5 A. I started out as a mechanical engineer,
6 design mechanical engineer. And I started out
7 doing design work on various aspects of the 737,
8 the 757 model airplane, including the systems that
9 cooled the avionics equipment that's located down
10 below the floor level.

11 And from there I went in to design of
12 cargo fire and smoke protection systems for the 757
13 model airplane. After that I worked in the air
14 conditioning system design, the engine bleed
15 temperature control systems and also in the cabin
16 pressurization controls.

17 Q. Would it be fair to say then that you
18 worked in all aspects of the environmental control
19 system for these airplanes?

20 A. Yes.

21 Q. After you were the systems engineer,
22 excuse me, a mechanical engineer, were you promoted
23 during your tenure at Boeing?

24 A. Yes, after six years as a design engineer
25 I was promoted to the title of lead engineer, at

1 which time I was given responsibility to oversee
 2 the efforts and the works of a group of engineers
 3 working under me.
 4 Q. Now, were you lead engineer for a
 5 particular system on the aircraft?
 6 A. Yes, it was for the air conditioning
 7 systems, various parts of the environmental control
 8 system on the aircraft.
 9 Q. Were there specific aircraft that you
 10 were responsible for the design, analysis and
 11 certification of?
 12 A. Yes, the 737 and the 757 models were my
 13 primary area of responsibility.
 14 Q. Did there come -- now, how long were you
 15 the lead engineer for the 737 and the 757
 16 environmental control systems?
 17 A. A period of almost nine years.
 18 Q. And then were you once again promoted
 19 during your tenure at Boeing?
 20 A. Yes, I received two other promotions. In
 21 1994 I received a designation from the Federal
 22 Aviation Administration, the designation called,
 23 Designated Engineering Representative. It's a
 24 license that the FAA grants to individuals within
 25 private industry. It's issued to roughly five

1 A. In Oregon and as well as in Washington.
 2 Q. And then after the designation
 3 professional engineer, what other initials are
 4 there normally after your name?
 5 A. The letters I referred to a minute ago,
 6 DER, again, stands for Designated Engineering
 7 Representative. And that's the FAA license.
 8 Q. FAA. You said that was the Federal
 9 Aviation Administration?
 10 A. Yes, it is.
 11 Q. Where is the FAA located?
 12 A. The FAA has offices all over the nation.
 13 There's a branch office in the Seattle area, an
 14 office that I continue to work through in my
 15 conduct of those DER responsibilities.
 16 Q. Is the Federal Aviation Administration a
 17 private company or a public entity?
 18 A. No, it's a federal government agency.
 19 It's a branch of the U.S. Department of
 20 Transportation.
 21 Q. Tell the jury what is the role of the FAA
 22 insofar as the manufacture of commercial passenger
 23 airplanes is concerned?
 24 A. The FAA maintains a large volume of
 25 design requirements for aircraft. Those

1 percent of the engineers in that industry. And
 2 that person's responsibilities involve conducting
 3 design analysis to determine if the particular
 4 airplane meets the FAA's rules for safety.
 5 Q. Okay. Let me back up here, because I
 6 think we covered a lot of ground there.
 7 The first thing you said is that you
 8 received some sort of certification. You know, you
 9 are not a doctor, correct?
 10 A. That's correct.
 11 Q. So you don't have the -- either the words
 12 MD or Ph.D. after your name, do you?
 13 A. No, that's correct.
 14 Q. But you do have some initials after your
 15 name, don't you, normally, in terms of your
 16 professional capacity?
 17 A. Yes, I do.
 18 Q. What would be the first designation that
 19 you have?
 20 A. Typically the first two are PE,
 21 representing professional engineer. And that's a
 22 state licensing designation that allows me to
 23 practice as a professional engineer.
 24 Q. Okay. Now, in what states have you been
 25 licensed as a professional engineer?

1 requirements relate to performance minimum
 2 capabilities. They specify margins of safety.
 3 They specify acceptable failure modes, failure
 4 rates, failure probabilities. And they encompass
 5 virtually every aspect of the aircraft. Virtually
 6 every single part of the aircraft is evaluated
 7 relative to those FAA rules.
 8 So the FAA, although those rules are
 9 constantly upgraded and changed, the FAA maintains
 10 those rules as the way of guaranteeing that
 11 aircraft designed and operated in this country are
 12 safe for people to fly on.
 13 Q. Okay. And then you said you hold the
 14 FAA's designation of Designated Engineering
 15 Representative, correct?
 16 A. Yes, that's correct.
 17 Q. DER.
 18 Why does the FAA certify engineers,
 19 aerospace engineer engineers as Designated
 20 Engineering Representatives?
 21 A. The FAA doesn't perform design compliance
 22 analysis itself. It transfers the burden, the
 23 economic burden to do that analysis into the
 24 aircraft industry by naming Designated Engineering
 25 Representatives from private industry to do that

1 work on their behalf.

2 So their role is to maintain the
3 requirements. Their role is also to determine
4 whether individuals who apply to receive that
5 designation have the qualifications that are
6 necessary to perform the job correctly.

7 Q. Now, in your role as a Designated
8 Engineering Representative, were you -- did you
9 perform that function for the Federal Aviation
10 Administration?

11 A. Yes, I did. I performed that function as
12 an employee of the Boeing Company starting in 1994.
13 And then after leaving the Boeing Company in 1999 I
14 reapplied to the Federal Aviation Administration
15 for the DER designation as an independent
16 consulting engineer and did receive the designation
17 after that application.

18 Q. What did you have to go through, what
19 processes did you have to go through to be
20 certified as a Designated Engineering
21 Representative?

22 A. Well, there's a period of review, the FAA
23 looks at one's work performance over a number of
24 years. The FAA evaluates the experience that one
25 has achieved or has reached with their work. And

1 since leaving?

2 A. I have done environmental control system
3 design work for crew rest compartments to be
4 installed on large aircraft, long-range aircraft.
5 These are sleeping compartments for the crew. And
6 my involvement in those designs, again, has been in
7 the environmental control system area, the
8 ventilation and pressure controls.

9 Q. What other kinds of consulting work have
10 you done since 1999 for companies other than
11 Boeing?

12 A. I've done work in the general
13 construction industry. I designed the
14 environmental control system for hospital operating
15 room and for some hospital patient rooms, for a
16 hospital in Alaska.

17 I also do design certification work on --
18 for companies that produce overhauled replacement
19 parts for the aircraft industry.

20 Q. How much are you charging for your time
21 as a consultant in this case?

22 A. \$175 an hour.

23 Q. Now, before we go into the details of the
24 environmental control system, can you tell me based
25 on your review of the records in this case what

1 there's also an examination that finalizes the
2 process.

3 Q. When did you first become a Federal
4 Aviation Administration Designated Engineering
5 Representative?

6 A. I started -- I started working doing
7 analysis work actually in 1992, but I received the
8 designation in 1994.

9 Q. What percentage of aerospace or aircraft
10 engineers become FAA Designated Engineering
11 Representatives?

12 A. It's something less than five percent.

13 Q. And after you left the Boeing companies
14 in 1999, did you maintain your certification with
15 the FAA?

16 A. Yes, and I am certified today in that
17 capacity.

18 Q. Now, why did you leave the Boeing Company
19 in 1999?

20 A. I wanted to go into private practice and
21 become a consulting engineer.

22 Q. Have you done work for Boeing since you
23 left them in 1999?

24 A. Yes, I have.

25 Q. What kind of projects have you worked on

1 particular planes Lynn French flew on as a flight
2 attendant for TWA?

3 A. Yes, I believe she flew on a Boeing model
4 707, 727, a 747, 757, 767, the Lockheed L-1011.
5 And I believe various models of the McDonnell
6 Douglas MD 80 aircraft.

7 Q. Did Boeing manufacture all of these
8 planes?

9 A. No, the Boeing did not manufacture the MD
10 80 aircraft nor the Lockheed L-1011.

11 Q. But they manufactured the other five --
12 what I'll call the 7-series planes?

13 A. Yes, that's correct.

14 Q. Including the 757 that you had the design
15 responsibility for the environmental control system
16 on?

17 A. That's correct.

18 Q. Are you familiar with each type of
19 aircraft that she flew?

20 A. Yes, I am.

21 Q. Okay. We said earlier you mentioned what
22 the environmental control system was.

23 What is the purpose of the environmental
24 control system; what purpose does it serve when a
25 plane is at cruise altitude.

1 Maybe we should define cruise altitude.

2 A. That would be the altitude for the
3 airplane after climbing up would level off and
4 conduct the majority of the flight at that level.

5 Q. What purpose does the environmental
6 control system serve then at cruise altitude?

7 A. Well, the conditions outside the airplane
8 of course are very cold and it's pressure is very
9 low. So the environmental control system
10 pressurizes the cabin and heats or cools the air as
11 required to make the cabin comfortable and safe for
12 those people inside.

13 Q. Is there a typical altitude, cruise
14 altitude that the Boeing planes are designed and
15 fly at?

16 A. Yes, each of the airplane models is
17 designed to cruise at a different maximum altitude.
18 For example, the 737 is only certified to cruise up
19 to 37,000 feet. The 757 or 767 are allowed to go
20 up to 42,000 feet. So there's some range in the
21 upper limit that each can fly.

22 But typically an airplane flying domestic
23 routes within the United States or even
24 international routes will fly somewhere in the
25 30,000 foot range, 30 to 40,000 feet.

1 In airplane terms or in design terms, we refer to
2 the cabin pressure in terms of cabin altitude.
3 It's kind of a shorthand for talking about the
4 pressure. So when the airplane is on the ground
5 the cabin altitude is the same as the airplane
6 altitude.

7 Q. In Miami what would that altitude be,
8 Miami International Airport?

9 A. Six feet or some such number.

10 Q. Essentially it's sea level?

11 A. Sea level. Yes.

12 Q. When a plane is at 35 to 40,000 feet at
13 cruise altitude, at what altitude is the inside of
14 that cabin pressurized to?

15 A. The equivalent cabin altitude, by the
16 time the airplane reaches cruise altitude is
17 typically between 5 and 8,000 feet. So if the
18 airplane is going to cruise at its maximum
19 certified flight level, the cabin altitude will
20 approach 8,000 feet. If the airplane is somewhat
21 below its certified maximum limit, then the cabin
22 altitude will also be lower.

23 Typically domestic flights, you know,
24 travelling across the United States, the cabin
25 altitude will rise from take off, it will rise up

1 Q. How is the environment inside the cabin;
2 how is the air pressure in the cabin controlled
3 compared to the cruise altitude?

4 A. Well, the pressure inside the cabin is
5 regulated by the cabin pressurization control
6 system. And it's regulated to do a number of
7 things. It keeps the pressure as constant as
8 possible for comfort during the times of climb and
9 descent, at the beginning and the end of the
10 flight, when the pressure has to change and the
11 pressure is changed very gradually and very
12 smoothly so as to prevent discomfort in people's
13 ears.

14 But ultimately the system is designed to
15 keep the pressure inside the cabin at a high enough
16 level that the oxygen content is safe for people to
17 breathe.

18 Q. Okay. When a plane is on the ground at
19 the gate and the front door is open and passengers
20 are coming on the plane or they're getting off the
21 plane, let's take Miami for example, at what level
22 is the air pressure inside the cabin in Miami with
23 the door open?

24 A. Well, the pressure inside would be
25 equivalent to the pressure outside the airplane.

1 to roughly a 5 to 6,000 foot equivalent altitude.
2 And then during descent into the destination it
3 will descend down into whatever the destination
4 field altitude is.

5 Q. If the cabin is pressurized at between
6 5,000 and 8,000 feet, are there any examples you
7 can give the jury about a location that would have
8 a similar air pressure?

9 A. Yes, Denver, Colorado, for example, is
10 situated in the Rocky Mountains at 5,280 feet above
11 sea level. So that's being in an airplane cabin
12 for a typical domestic flight is roughly equivalent
13 to going to Denver, Colorado. I think Mexico City
14 is upwards of 8,000 feet, so if the airplane is
15 going to cruise at its maximum certified cruising
16 altitude then the equivalent cabin altitude will be
17 more like the altitude in Mexico City. Excuse me,
18 I think Santa Fe, New Mexico is at 6,500 feet. So
19 those are rough equivalents to what you might
20 expect to find in an airplane cabin.

21 Q. Did you earlier describe that as thin
22 air?

23 A. Yeah, the air is thinner. Just in terms
24 of numbers, the pressure in the -- the oxygen
25 content in the air at 8,000 feet is about

1 three-fourths what it is at sea level. The
2 pressure is lower, the air is thinner. People
3 sometimes notice that difference and feel they have
4 to breathe a little bit more deeply at those higher
5 altitudes.

6 Q. Are the environmental control systems
7 that are used on modern jet planes, and in
8 particular the planes flown by Ms. French, are they
9 the same or are they different?

10 A. There are some minor differences between
11 them, but they're all remarkably similar as well.

12 Q. Why is that?

13 A. Well, mostly because the companies that
14 produce the detailed parts of those systems, there
15 are really two major companies in the United States
16 that do the detailed part design. And because
17 there are only two companies, they -- there's a lot
18 of similarity across the airplanes. In fact, the
19 two companies themselves produce equipment that's
20 virtually identical.

21 Q. Well, is there one major difference
22 between the design of the airplanes flown by Lynn
23 French in terms of the environmental control system
24 or the ventilation system?

25 A. Yes, as I alluded to a little bit

1 Q. We've listed here 7 types of aircraft,
2 the Boeing 707, the 727, the L-1011, MD 80, the
3 767, the 747 and the 757?

4 A. Yes, this bar chart simply shows that the
5 fraction of that air delivered to the cabin for
6 each of these models that that's directly from
7 outside air coming in from the engine.

8 As you can see, these first three models,
9 the 707, the 727 and the L-1011, have 100 percent
10 outside air delivered to the cabin. Those are the
11 one-pass airplanes, that means the air comes in
12 overhead, passes through the cabin once and exits
13 the return grills at the floor level.

14 These other models the MD 80, 767, 747
15 and so on do utilize some recirculation wherein a
16 fraction of that cabin air is extracted, passed
17 through a high efficiency filter and returned to
18 the cabin mixed with the outside air and delivered
19 to the cabin for a second pass.

20 Q. So if I understand your testimony then,
21 and let's just take the MD 80 for example, 66
22 percent of the air at any point in time in the
23 cabin is fresh outside air?

24 A. Yeah, that's right.

25 What that says is for every two parts of

1 earlier, the one difference is whether the airplane
2 utilizes a one-pass ventilation system or whether,
3 meaning the air only passes through the cabin one
4 time, or whether there's recirculation.

5 Q. Now, when air -- we'll talk about this --
6 but when air is recirculated, is 100 percent of the
7 air recirculated?

8 A. No, depending on which airplane model
9 you're talking about. But it's in all cases less
10 than half or less, virtually less than 50
11 percent --

12 Q. Okay.

13 A. -- of the air.

14 Q. Mr. Sands, did you prepare a chart that
15 illustrates which planes Ms. French flew, which
16 ones were one-pass systems and which once were
17 recirculating systems?

18 A. Yes, I did.

19 MR. ENGRAM: I'm showing it to the court.

20 THE COURT: What is the title?

21 MR. ENGRAM: Variations in modern
22 aircraft.

23 Mr. Sands, if you could step down for a
24 moment and explain.

25 BY MR. ENGRAM:

1 outside air its -- as you see on the 747, it's
2 roughly a ratio of 3 to 1. 3 parts of outside air
3 for 1 part of recirculated air.

4 Q. Let's talk a little bit about the
5 specific equipment or the components on the
6 environmental control systems of modern airplanes.

7 Did you prepare another chart that shows
8 the equipment on the plane?

9 A. Yes, I did.

10 Q. This is entitled, cabin air circulation.
11 How does it work?

12 A. Okay, this chart shows the basic elements
13 of the environmental control system. The engine of
14 course where the air from outside the airplane
15 enters, it's compressed and heated. Beyond the
16 engine there's an ozone converter, which transfers
17 molecules of ozones into breathable air.

18 The air conditioning system regulates the
19 flow and pressure and temperature of that air
20 delivered to the cabin. And for those airplanes
21 that do have recirculation, the high efficiency
22 particulate filter would be used to clean that
23 fraction of the air that's extracted from the
24 cabin. It would be fixed with the air coming from
25 the engine and of course then that mixture is

1 delivered to the cabin using the aircraft's air
2 distribution system, which is just a series of
3 ducts and nozzles installed inside the aircraft.

4 Q. Okay. So with a one-pass system, there
5 are certain elements of this equipment that are not
6 included in the environmental control system?

7 A. Yes, the one-pass systems do not have the
8 filter or the mixing chamber. The air from the
9 engine after the pressure temperature and flow has
10 been controlled is delivered directly to the
11 airplane through the air distribution system.

12 Q. Now, you mentioned air from the engine.
13 At what point in time is the air, I think you
14 called it bleed air earlier, at what point in time
15 is the air bled from the engine for use in cabin
16 air circulation?

17 A. Well, the engine is a gigantic compressor
18 followed by a combustion chamber and then a turbine
19 that converts the expansion downstream of the
20 combustion chamber into torque. But the big
21 compressor section up front is like a whole series
22 of fans. The engine may have up to 17 of these fan
23 stages that air passes through and is compressed,
24 pressurized at each stage a little bit more.
25 Before it gets to the combustion chamber.

1 The environmental control system has the task of
2 cooling that air down to a temperature that's
3 needed for comfort in the cabin.

4 So the first phase of the air
5 conditioning system is actually installed out in
6 the engine compartment itself. And the first phase
7 of the processing is to cool the air down and make
8 it safe to transport to the next phase of the
9 system.

10 Q. I didn't ask you, does this depict a
11 one-pass ventilation system or a recirculation
12 system?

13 A. This does depict a recirculation system.
14 I'll talk about this filter and how it plays in
15 here in just a minute.

16 Before the air gets to that area where
17 the recirculated air is mixed, typically out in
18 this part of the airplane or maybe even down at the
19 bottom of the airplane would be ozone converter.
20 If the airplane is designed to operate in -- at
21 latitudes and at locations around the planet where
22 the ozone concentration is above safe limits, then
23 the airplane would be fitted with an ozone
24 converter. And again, that ozone converter would
25 simply take the ozone that's ingested from the

1 So the environmental control system takes
2 air from those stages that are way upstream from
3 the combustion chamber and therefore, the air that
4 has not yet been affected by the combustion
5 process.

6 Q. So we're not pulling in air from the
7 exhaust of the engine, right?

8 A. No, no, that's right.

9 Q. All right. Well, let's talk about then
10 how this cabin air circulation actually works
11 inside the cabin, or from that point in time where
12 it's bled from the engine.

13 Okay.

14 A. Okay, well, this chart shows a cutaway of
15 the airplane, the body of the airplane, the wings
16 and the engine. And it's done in schematic form so
17 that you can kind of see the path that the air
18 takes through the airplane.

19 Again, you see the engine inlet here
20 where the outside air passes, gets into the engine.
21 This red number one is symbolizing the beginning of
22 the environmental control system.

23 Again, as the engine compresses that air,
24 the air gets very hot. The air can approach 1,000
25 degrees fahrenheit at some engine thrust conditions.

1 engine and transform it into breathable oxygen.

2 Ozone is three molecules of oxygen hooked
3 together. What we need to breathe, of course, is
4 two molecules of oxygen. So the converter does
5 that transformation.

6 Once the air comes out the ozone
7 converter, there typically is more equipment down
8 in the body of the airplane than we've shown here.
9 But for purposes of simplicity, we've shown the air
10 conditioning system equipment all located out
11 there.

12 Once that air has been processed so that
13 the pressure and the temperature is right for the
14 cabin occupants, then at this point it is mixed
15 with that, that fraction of air that's
16 recirculated. If the airplane has a recirculation
17 system. And this schematic shows one that does
18 have that.

19 Q. How does the air, once it either -- if
20 there's not a mixing chamber or if there is, once
21 it leaves the mixing chamber, for example, how does
22 the air then get into the cabin?

23 A. The air, as you see, passes through duct
24 work that carries it up typically to the overhead
25 area in the cabin. And in the overhead area there

1 are nozzles or delivery systems that release that
2 air into the cabin virtually all along the center
3 line of the airplane.

4 Now, some, this picture is depicting an
5 aircraft that has a single aisle. The larger
6 aircraft, we call wide body aircraft, obviously
7 have two aisles. In some cases there are two of
8 these nozzles, one over each aisle. There's
9 different schemes developed for delivering that air
10 into the passenger cabin.

11 As you see here, there's air coming in
12 the center nozzle. There's also air carried
13 through little ducts, that are not shown, to
14 nozzles that are over here directly above the
15 seating area. Including the adjustable air outlet
16 that you typically see that has a round feature
17 that you can control yourself from the seat.

18 Q. Okay. How does the air move inside the
19 passenger cabin when it's introduced into the cabin
20 at this point?

21 A. Well, it's designed to come in overhead,
22 all along the length of the airplane and move
23 basically move downward through the seating area of
24 the cabin. And then once it gets to the floor
25 level it passes out through return air grills.

1 Those are located in different places depending on
2 airplane model. But sometimes they're over in this
3 side wall here.

4 But the basic theme is that the air comes
5 in overhead, moves downward and then passes out.

6 Q. If we took the jury box as an example,
7 are there air vents where the air is delivered into
8 the cabin in this row and a separate group of air
9 vents for the second row of the jury box?

10 A. Yeah, in essence it's that way. Of
11 course, the air delivery nozzles that are directly
12 above the seating area are local to that seating
13 zone. The main nozzle overhead, of course,
14 delivers air all along. But the design is such
15 that the air that comes down for this row, for
16 example, would not be blown backwards and be
17 presented to the people in the row behind you.
18 That air would come down and pass out the floor
19 level.

20 And, likewise, for the back row, the air
21 that's presented to that row would also pass
22 downward and then exit at the floor level. So the
23 concept is for the air to move downward, not
24 forward and aft.

25 Now, to the extent that people walking

1 around may cause some air movement, apart from
2 that, it's not absolute or perfect, but that's the
3 basic theme.

4 Q. That's what you're referring to under
5 number 4; is that right?

6 A. Yes, so number four just says that the
7 air leaves through those return grills that are
8 placed at floor level. And those return grills are
9 all up and down the cabin so just the same way the
10 delivery nozzles are. You kind of imagine the
11 column of air moving downward throughout the whole
12 airplane all at the same time.

13 Q. And then step five in the cabin air
14 circulation process, what happens there?

15 A. Well, for that fraction of air that will
16 be recycled or returned to the cabin, it's first
17 passed through a high efficiency particulate air
18 filter. That's a filter that is designed to remove
19 virtually all the particulate matter from the air.
20 It's a filter technology that was designed back,
21 actually originated after World War I as a means of
22 operating during times of biological warfare, but
23 it's a technology that's been carried forward.
24 It's now used on aircraft. It's used in hospital
25 operating rooms. Virtually the same equipment is

1 used in hospital operating rooms.

2 And it's an expensive filter technology,
3 but it's very effective at filtering out the
4 particulates in the air; in particular, those
5 associated with environmental tobacco smoke.

6 Q. Let me hand you this piece of equipment
7 and ask you if you recognize that?

8 A. Yes, that's a high efficiency particulate
9 air filter. In engineering terms it's referred to
10 as a HEPA filter, which is just the first letters
11 of those four words. And it's made up of a
12 semiporous paper, which is pleated back and forth
13 in kind of an accordion fashion so that in fact
14 there's a tremendous amount of surface area inside
15 the filter where particulates can be captured and
16 trapped and prevented from passing on through the
17 filter.

18 Q. How small a particulate -- I guess maybe
19 we should tell the jury what you mean specifically
20 by a particulate.

21 A. Well, a particle or -- you know, anything
22 that's -- that's solid in nature. For example, the
23 smoke from a cigarette. Environmental tobacco
24 smoke is composed of a whole series of particles
25 all of different sizes. Those particles range from

1 being -- you know, from tenths of millionths of an
2 inch in diameter to some particles that are a
3 little bit bigger than that.

4 Filters of this nature, high efficiency
5 filters, take out virtually all, 99.7 or 99.9
6 percent of the particles of the size associated
7 with environmental tobacco smoke.

8 Q. Can you give an example? For example,
9 how thick is one strand of human hair?

10 A. A human hair, I believe, is
11 seventy-millionths of an inch in diameter. And
12 this filter will take out particles that are less
13 than a tenth of a million. So a human hair is, you
14 know, 70 -- 200 times larger than the particles
15 that this filter can take out.

16 Q. Where else are HEPA filters used, what
17 other applications?

18 A. Well, as I said earlier, originally they
19 were used in military machines for biological
20 warfare, but they're also now currently used in
21 hospital operating rooms to clean the air that's
22 presented to the operating table itself.

23 Q. Are these filters replaced on a regular
24 basis?

25 A. Yes, they are. When an airplane is

1 Q. What's the typical humidity on an
2 airplane?

3 A. It depends on whether it's a one-pass
4 airplane or whether it's an airplane that has
5 recirculation. Also depends on whether there's
6 food being served and the number of passengers.
7 But typically on a one-pass airplane, humidity will
8 be down on the order of 10 percent relative
9 humidity.

10 On the an airplane with recirculation,
11 it's often higher than that, 15 and sometimes 20
12 percent relative humidity. But the humidity is
13 very low in the airplane simply because the air
14 that's drawn in through the engine from outside the
15 airplane has virtually no moisture in it. So...

16 Q. And because it has no moisture, would it
17 be fair to characterize the air on an airplane as
18 very dry?

19 A. Yes, it is very dry.

20 Q. Now, you said it was 10 percent relative
21 humidity. Today it happens to be raining in Miami,
22 but the humidity in Miami outdoors today, you would
23 guess is what?

24 A. Closer to 100 percent.

25 Q. And in a typical building environment

1 designed and when a filter is developed for a
2 particular airplane, the airplane designers have to
3 estimate the particulate holding capacity of the
4 filter. If they design the filter to hold -- a
5 very large filter to hold a tremendous amount of
6 particulate, it's larger.

7 But ultimately the designers define the
8 service interval for a particular filter
9 installation. And then once the airplane goes into
10 service, that design parameter is carried forward
11 into the aircraft maintenance records. And the
12 airline then is obligated to replace the filter at
13 whatever that design interval is.

14 Q. So we've talked about temperature, that
15 the environmental control system regulates the
16 temperature of the air in the cabin.

17 And we've talked about the fact that it
18 regulates the cabin pressure.

19 We've talked about how this filter is
20 highly efficient in removing particles from the
21 air.

22 Is there any other aspect of the aircraft
23 cabin environment that the system does not address?

24 A. Well, there are parameters such as
25 humidity.

1 like this courtroom that does have air
2 conditioning, what would you say based on your
3 training and experience that the humidity levels
4 would be in the courtroom?

5 A. Well, the design standards for buildings
6 and for occupied spaces suggest that if one can
7 achieve humidities in the range of 50 to 70
8 percent, the people will find the space to be more
9 comfortable. This courtroom probably has humidity
10 somewhere on that level.

11 Q. Is there any practical way to humidify or
12 put moisture into the air on airplanes?

13 A. No, it's very difficult to do. And there
14 are other consequences that that humidity would
15 present to the airplane structure if it were done
16 that way, consequences that stem from corrosion and
17 the fact that that humidity would condense out on
18 the cold structure. Because, remember, the
19 airplane is flying up there where the ambient
20 temperature outside the airplane is on the order of
21 60 degrees below zero. Very cold. The airplane
22 structure is very cold. And any moisture that's in
23 the air moving around the airplane that contacts
24 the skin of the airplane then gives up that
25 moisture through condensation.

1 So anyway, there are reasons why it's
2 very difficult to affect a higher humidity in the
3 airplane cabin.
4 Q. Okay. Let's -- we've talked about the
5 two basic systems, the one-pass system and the
6 ventilation system -- I mean, excuse me the
7 recirculation system. Is there a term that is used
8 in your profession to talk about how often the air
9 is exchanged in the airplane cabin?
10 A. Yes, the air change rate or the
11 ventilation rate are two different terms that are
12 used. The ventilation rate typically is a number
13 that tells you how many times the air is changed in
14 a given hour.
15 The air change rate may also be listed or
16 computed and shown in terms of the number of
17 minutes that are required for all the air in the
18 airplane to pass through and to be -- to exit the
19 airplane.
20 Q. Okay. And have you prepared a chart that
21 describes the air change rates for the planes that
22 Lynn French flew?
23 A. Yes, I have.
24 THE COURT: Before we put that chart up.
25 I think we might need a little break.

1 How much more do you think you've got in
2 your direct?
3 MR. ENGRAM: Probably about 15 or 20
4 minutes.
5 THE COURT: Let's take a short break now.
6 And then return.
7 If you can have a seat here so the jury
8 will exit.
9 (Jury exits courtroom.)
10 THE COURT: Please, have a seat.
11 The jury requested coffee. So we made
12 some coffee for them.
13 MR. REILLY: Judge, before you bring them
14 back in, there's one small issue I'd like to
15 take up.
16 MR. WEINSTEIN: How about the lawyers,
17 don't we get coffee?
18 MR. REILLY: I don't know whether --
19 Mr. Weinstein I think is going to cross
20 examine this witness.
21 MR. WEINSTEIN: Probably.
22 MR. REILLY: It's if not you, I'll refer
23 to somebody else.
24 MS. WEINSTEIN: We haven't decided. No,
25 I'm just kidding.

1 MR. WEINSTEIN: We sort of shoot from the
2 hip. We choose.
3 MR. REILLY: That's what they told me in
4 Fontana, too.
5 There is or was on our exhibit list at
6 one time and we removed it --
7 THE COURT: Excuse me.
8 One of the juror's wives is on the phone
9 saying that there's an emergency in his house
10 or whatever. So Nicole will take him to use
11 the phone to see what that's about. And
12 that's Kenny Abreu.
13 MR. REILLY: That's what?
14 THE COURT: The juror's name is Kenny
15 Abreu.
16 MR. REILLY: The truck driver.
17 Let me take this up while we have it.
18 Because Mr. Weinstein indicated he might try
19 to do this.
20 In the class action there was a videotape
21 that was used to show the circulation of the
22 air in the aircraft. Obviously we didn't use
23 it, we're not using it with this witness. I
24 just want to make sure that no one talks
25 about -- there was a question posed, it wasn't

1 even an accurate question, but there was a
2 question posed, as I recall, in Broin about
3 how much it cost to make the video.
4 And I would seek a motion in limine or I
5 am making a motion in limine to prevent any
6 discussion of the cost of making the video.
7 THE COURT: Does the Plaintiff intend to
8 refer to this?
9 MR. WEINSTEIN: Well, I was thinking of
10 asking him whether or not he was aware of a
11 video that was prepared at the cost of a
12 quarter of a million dollars.
13 THE COURT: And what would be the
14 relevance of that?
15 MR. WEINSTEIN: Well, that's evidence
16 that they have available, but chose not to
17 bring it before this --
18 THE COURT: First of all, the cost of it
19 has nothing to do with whether they have it
20 and whether it's available.
21 MR. WEINSTEIN: I won't mention it. You
22 don't have to rule.
23 THE COURT: I'm trying to understand what
24 it can be relevant to.
25 MR. WEINSTEIN: By now, Judge, I can tell

1 where you're going, I think.
 2 THE COURT: Sometimes you can convince me
 3 of positions.
 4 MR. WEINSTEIN: I haven't been able to
 5 convince you from the day we started this
 6 trial.
 7 THE COURT: No, the record will indicate
 8 exactly what everybody has said. Luckily we
 9 have court reporters.
 10 I don't see the relevance of it,
 11 especially if it's not being used now.
 12 MR. WEINSTEIN: Okay. I understand,
 13 judge.
 14 THE COURT: So now we're going to have to
 15 wait to see if that juror has to leave.
 16 Bring them in, please.
 17 (Jury enters courtroom.)
 18 THE COURT: Everyone have a seat, please.
 19 And we will resume with the direct examination
 20 of the witness.
 21 BY MR. ENGRAM:
 22 Q. Mr. Sands, before we took the break, we
 23 were talking about the air change rate in
 24 commercial passenger aircraft. And did you prepare
 25 a chart that showed the refresh rates or the air

1 the first flight was in 1957. So it was, again, it
 2 was the very first jet aircraft produced in this
 3 country.
 4 Q. Why is it important to have these air
 5 change rates or refresh rates?
 6 A. Well, the air passing into the passenger
 7 cabin does a number of things. It heats or cools
 8 the passengers and the other equipment and things
 9 in the airplane. And it's also responsible for
 10 carrying any particulate that may be in the cabin
 11 air out of the cabin, either to exit the return
 12 grills or to be returned through the filtered
 13 recirculation system.
 14 Q. Okay. And just for example, then, if we
 15 look at the model that you designed, the
 16 environmental control system on the 757, how many
 17 air changes every hour on average are on the Boeing
 18 757?
 19 A. Well, as you see, that airplane undergoes
 20 32 air changes an hour. So every hour the volume
 21 of air in the airplane is completely changed out 32
 22 times.
 23 So it's a little easier and when I
 24 typically think in terms of the number of minutes
 25 between air changes.

1 change rates of the planes flown by Ms. French?
 2 A. Yes, I did.
 3 Q. Again, for the record this is chart
 4 entitled, variations in modern aircraft. What are
 5 the number of air changes per hour?
 6 Now, let's just orient the jury to the --
 7 to this chart and the column on the left side of
 8 the chart we have numbers 0, 10, 20, 30, 40; what
 9 does that represent?
 10 A. Those correlate to the number of air
 11 changes per hour for each of the airplane models
 12 across the bottom as listed.
 13 Q. And I note then at the bottom, the seven
 14 models flown by Ms. French are listed. But there's
 15 not a blue column for the Boeing 707. Can you
 16 explain why there's not a column for that?
 17 A. Yes, this data was taken from federal
 18 government report issued in 1989. And that federal
 19 government report did not report this parameter for
 20 the 707 model airplane. I do know from my personal
 21 work experience on that airplane that it's in the
 22 same order as these aircraft that are shown.
 23 Q. When was the Boeing 707 first
 24 manufactured by Boeing?
 25 A. Well, it was in 1955, I believe, maybe

1 So you see in parenthesis above these
 2 blue bars numbers on the order of three minutes
 3 down to 1.9 minutes. So that's the time that it
 4 takes for the volume of air that's in the cabin to
 5 be replaced with another charge of air.
 6 Now, you see these numbers ranging
 7 roughly from two to three minutes. Contrast that
 8 with a typical office building like this one that
 9 we're in now, we might expect this building to have
 10 been designed for an air change somewhere between
 11 20 and 60 minutes in this room. That would be
 12 typical of an office building.
 13 In your home an air change can take from
 14 one to three hours depending on how tightly sealed
 15 your house is and how much wind there is and that
 16 kind of thing.
 17 Again, contrasting an airplane with a
 18 hospital operating room. The hospital operating
 19 room would be designed for an air change roughly
 20 every six minutes.
 21 So what you see is that the air is
 22 changed on the airplane very frequently and very
 23 fast. These air change times are very short.
 24 Q. Of all the examples that you've just
 25 given us -- and I think you can go ahead and take

1 your seat back -- but of all the examples that
 2 you've just given us, would it be fair to say --
 3 and this wouldn't matter whether we're talking
 4 about 1976 or 1996, would it?
 5 A. No, that's correct. They're all similar
 6 in that way.
 7 Q. So we have airplanes. And from this
 8 chart I'm going to just round up on the 757, but
 9 what you're telling me and telling the jury is that
 10 every two minutes there's a complete change of the
 11 air in the aircraft?
 12 MR. WEINSTEIN: Your Honor, I object,
 13 it's clearly leading.
 14 THE COURT: It's leading, but it's really
 15 repeating his earlier testimony. So...
 16 MR. WEINSTEIN: And repetitious, judge.
 17 THE COURT: I don't think it's
 18 objectionable.
 19 You can answer.
 20 BY MR. ENGRAM:
 21 Q. I'm just trying to summarize this.
 22 Airplane, air change on a 757 is how many --
 23 happens every how many minutes?
 24 A. Approximately every two minutes.
 25 Q. Okay. And then on a Boeing 747, the

1 other end of the spectrum, how often does that
 2 change?
 3 A. Approximately a little over three
 4 minutes.
 5 Q. So the range on the planes flown by
 6 Ms. French is every two to three minutes, correct?
 7 A. Yes, that's correct.
 8 Q. And then you said that the operating
 9 room -- I'll just put hospital -- every six
 10 minutes; is that correct?
 11 A. Yes, that's right.
 12 Q. And then you said that an office building
 13 would be between -- there would be one change every
 14 20 to 60 minutes. So that would be either -- 20
 15 minutes?
 16 A. So that's one to two and a half times an
 17 hour if you want to look at it on an hourly basis.
 18 Q. You're right. But we're looking at it
 19 every 20 to 60 minutes?
 20 A. Right.
 21 Q. Somewhere in that range.
 22 And then a home you said would be
 23 every --
 24 A. Somewhere between one and three hours is
 25 very typical.

1 Q. Sixty to 180 minutes. Okay.
 2 Mr. Sands, based on your background and
 3 experience, do you have an opinion regarding how
 4 effective the environmental control system on board
 5 the planes flown by Ms. French were at removing
 6 environmental tobacco smoke from the cabin?
 7 A. Yes, I would say those systems are very
 8 effective at removing the ETS constituents.
 9 Q. What is the basis for your opinion that
 10 the environmental control systems are very
 11 effective at removing ETS?
 12 A. Well, of course my specific design
 13 experience in looking at all of the numbers and all
 14 of the capabilities, the equipment. But that
 15 experience is reflected in studies that have been
 16 done by the U.S. Government over the years. There
 17 are a number of studies, for example, a very
 18 detailed study done in 1989 by the U.S. Department
 19 of Transportation where measurements were actually
 20 taken on board aircraft. I believe there were
 21 90 --
 22 MR. WEINSTEIN: Your Honor, I object.
 23 It's bolstering. He's referring to something
 24 that's not in evidence, some --
 25 THE COURT: Okay. He's referring to some

1 other reports? Studies?
 2 MR. ENGRAM: I think he referred to the
 3 United States Department of Transportation
 4 study.
 5 THE COURT: He was asked, what is the
 6 basis for his opinion. So I think he can tell
 7 us.
 8 MR. WEINSTEIN: I can't cross examine
 9 that study.
 10 MR. ENGRAM: Pardon me?
 11 THE COURT: I'm looking at the answer
 12 here.
 13 Well, okay, he's identified the study as
 14 a basis for his opinion. Let's go on to
 15 another question.
 16 BY MR. ENGRAM:
 17 Q. Okay. Do the -- is the air change rate a
 18 factor in your opinion that the environmental
 19 control system is effective in removing ETS?
 20 A. Yes, it really is. The air change rate
 21 leads to a very high degree of dilution of any
 22 particulate or any compounds that might be released
 23 into the air either from smoking or from other
 24 sources in the passenger cabin. And it's that
 25 dilution, that rapid through flow and dilution that

1 gives rise to the capability of the system overall
2 to maintain low levels of cabin air constituents.

3 Q. Does the manner in which the air is
4 distributed within the cabin contribute to your
5 opinion?

6 A. Yes, it does.

7 Q. How so?

8 A. Well, the overall scheme, as we kind of
9 talked about earlier, of the air being delivered up
10 overhead and the air being designed to move
11 downward through the seating area and then exit the
12 floor level is the scheme that allows contaminants
13 to be released in one part of the cabin and not be
14 found in other parts of the cabin. That air that
15 passes downward through the seating area of the
16 airplane, then goes out the return grills on the
17 floor and the air is not carried forward and aft in
18 any significant way. So that's part of the way the
19 system deals with contaminants.

20 Q. And you're using -- when you said that
21 the air is not carried forward or aft, what do you
22 mean by aft?

23 A. Well, if you're standing at any
24 particular point in the cabin, you would expect the
25 air that's delivered just ahead of you to exit the

1 A. No, that's not -- to me does not
2 characterize the way the aircraft works relative to
3 its dealing with environmental tobacco smoke.

4 Q. Well, let's say that there was some
5 malfunction in the environmental control system,
6 what would happen from a design perspective if one
7 air conditioning pack was not operating properly?

8 A. The air conditioning packs have flow
9 regulating devices built into them. And those flow
10 regulating devices have different flow settings.
11 Typically, the -- those flow regulating valves
12 operate at an intermediate flow mode so if one air
13 conditioning pack turns off or goes to an
14 abnormally low flow mode. The other pack in the
15 system would move to a higher flow. Most of the
16 time in that case the equivalent level of flow from
17 the single operating pack is not quite as high as
18 the flow associated with two packs, but it
19 approaches it.

20 Q. Well, how long would the airline be
21 allowed to operate a plane that had a problem or
22 malfunction with the environmental control
23 system --

24 MR. WEINSTEIN: Your Honor --

25 THE COURT: I'll sustain the objection

1 floor ahead of you and the air that's behind you to
2 exit the floor behind you.

3 Now, having said that, the fact that
4 there are passengers and people moving up and down
5 the aisle, there is some movement of air forward
6 and aft within a relatively short range, that's
7 caused by those people moving around.

8 Q. But the term aft means -- what part of
9 the plane are you referring to?

10 A. Backward, toward the back of the plane
11 versus toward the front of the plane.

12 Q. Would it be fair to say then that the air
13 distribution system prevents the air from drifting
14 in the cabin?

15 A. Yes, it's designed to do that.

16 Q. Do you hold these opinions to a
17 reasonable degree of scientific probability?

18 A. Yes, I do.

19 Q. Now, there have been claims made that the
20 environmental control systems on these aircraft did
21 not work particularly well. That the aircraft
22 would be filled with clouds of smoke, for example.
23 Based on your experience in designing and the
24 manufacture of these aircraft, is that an accurate
25 statement?

1 BY MR. ENGRAM:

2 Q. You're familiar with the FAA regulations,
3 correct, as an FAA Designated Engineering
4 Representative, Mr. Sands?

5 A. Yes.

6 Q. If there were a problem or malfunction in
7 the environmental control system, what do the FAA
8 regulations provide with respect to operation of
9 the plane under those conditions?

10 MR. WEINSTEIN: Objection.

11 THE COURT: What's your objection?

12 MR. WEINSTEIN: Well, first it would be
13 hearsay. It's not even in evidence about what
14 some regulation required. And whether or not
15 even it was followed. So --

16 THE COURT: I'll sustain the objection.

17 BY MR. ENGRAM:

18 Q. Is it possible to operate a plane without
19 a properly operating environmental control system?

20 A. No, the FAA regulations require that the
21 airlines --

22 MR. WEINSTEIN: Your Honor.

23 THE COURT: No, that's the same question.

24 BY MR. ENGRAM:

25 Q. There's also been a claim made in this

1 case that there was a lot of smoke in the galley in
2 the E zone of the 747. How does the ventilation in
3 the galleys compare to the ventilation in the main
4 cabin?

5 A. Well, in the galleys typically there will
6 be extra grills, there's an exhaust system built
7 into the galleys that actually takes the air from
8 the galley and discharges that air overboard. So
9 rather than that air being mixed back in and
10 recirculated back in to the stream that's
11 redelivered to the passenger cabin, the galley area
12 is exhausted.

13 Q. So the air in the galley doesn't end up,
14 even on a plane that has recirculation, it doesn't
15 end up in this mixing box that you showed the jury
16 in the diagram?

17 A. That's correct.

18 Q. Given what you understand -- given the
19 design of the environmental control system on these
20 airplanes, there has been a claim made in this
21 trial that when smoking was permitted on the
22 airplanes, environmental tobacco smoke was
23 everywhere in the cabin.

24 Could this condition exist given the
25 design of the environmental control system?

1 present than if there are three or four smoking
2 rows. So adding more smoking rows doesn't give
3 rise to more smoke at any particular point in the
4 airplane. But it does make the visual image that
5 you see looking down the aisle of the airplane look
6 much, much different. So that's a variable that's
7 dependent on the way the airplane is configured,
8 where the smoking sections are.

9 It's also largely affected by the
10 lighting in the airplane, whether the lighting is
11 behind you, whether the lighting is ahead of you.
12 So the appearance of smoke is difficult to quantify
13 and is affected by a number of things. It's hard
14 to -- it's hard to pin it down in a real specific
15 way.

16 Q. Well, let's assume for the moment that
17 the smoking section of the cabin of one of the
18 planes that Ms. French flew was filled up with
19 smoke according to the flight attendant. Is there
20 any way for the captain to clear the cabin of
21 smoke?

22 A. Yes, the captain can turn on the
23 no-smoking sign. The captain can select the packs
24 to the air conditioning system to a higher flow
25 mode and increase the ventilation rate or speed up

1 A. Not to any significant degree. The odor
2 from cigarettes could certainly be detected
3 throughout the cabin.

4 The level of ETS particulate is another
5 story all together. I mean, the system reduces
6 those particulate levels to extremely low level,
7 apart from within the smoking area.

8 Q. Well, what if the claim was made that the
9 smoke was so thick in the cabin it was hard to see
10 from the back jump seat to the front of the plane;
11 could that condition exist given the design of the
12 environmental control system?

13 A. Well, my personal experience is I've
14 never been -- and I've been on smoking flights --
15 I've never been able to not see the length of the
16 cabin. Of course my knowledge of the design tells
17 me that it's improbable that you could ever get
18 that much smoke in a cabin.

19 Having said that, the lighting conditions
20 in the airplane and the number of rows involved in
21 the smoking section do give rise to a different
22 perception of how much smoke is in the air. If
23 you've got one or two smoking rows looking through
24 from one end of the airplane to the other, you get
25 a much different sense for how much smoke is

1 the air changes.

2 Q. What about on a recirculating type of
3 system; is there anything else that he can do?

4 A. Yes, he or she could also turn the
5 recirculation fans off causing the packs to go to a
6 higher flow mode and cause the cabin to clear a
7 little faster.

8 Q. Assuming that the captain turned on the
9 no-smoking sign, how long would it take on an
10 airplane to clear out the air, including the smoke,
11 in the cabin?

12 A. Well, those air change rates tell you --
13 tell us the number of minutes that it takes for the
14 volume of air in the airplane to be completely
15 changed out. So as you see, it's on the order of a
16 few minutes, two or three minutes.

17 MR. ENGRAM: Thank you, Mr. Sands.
18 Your witness.

19 THE COURT: Okay, cross examination.

20 CROSS EXAMINATION

21 BY MR. WEINSTEIN:

22 Q. Afternoon, Mr. Sands. I know the hour is
23 kind of late and I know a lot of people aren't
24 going to be too happy if I'm long. I'll try not to
25 be. So you'll please excuse me if I get to some

1 basics.
 2 My background is law and it's not
 3 engineering. So you'll please excuse me if I ask a
 4 few simple elementary, maybe common sense
 5 questions?
 6 A. Sure.
 7 Q. Okay.
 8 A. Would you like me to come down there so I
 9 can look at this chart with you.
 10 Q. Sure. Absolutely. Let's take a look at
 11 the chart. Incidentally, before we take a look at
 12 the chart. You testified before at the request of
 13 the tobacco companies, haven't you?
 14 A. Yes, I have.
 15 Q. We've seen you in other cases involving
 16 flight attendants, correct?
 17 A. I did testify in one other case, yes.
 18 Q. And you've been paid, I'm going to make
 19 it as short as I can. Just a lot of witnesses have
 20 been asked this question. Overall, just tell us
 21 the bottom line how much money you've been paid by
 22 the tobacco companies?
 23 A. Something on the order of \$20,000.
 24 Q. Now, I'm -- and incidentally you
 25 anticipate testifying again?

1 A. I don't know about that. I haven't been
 2 told.
 3 Q. Have you discussed that?
 4 A. No, I have not.
 5 Q. Let me ask you some questions now.
 6 I happen to look at this -- did you draw
 7 this diagram?
 8 A. Yes.
 9 Q. You drew this diagram?
 10 A. I sketched it out and some professional
 11 graphics firm transformed it into this nice
 12 picture.
 13 Q. Okay. I'm only asking because it sort of
 14 doesn't look exactly like the airplanes I've been
 15 on. So maybe we'll think -- I see this big aisle
 16 here. I mean, I have problems getting my little
 17 luggage through, you're shaking your head, is that
 18 correct?
 19 A. Yes.
 20 Q. Now what we've got here is some seats,
 21 and I'm going to take my pen, you know, and sort of
 22 like measure the width of the seat. If we look at
 23 the aisles we've got 1, 2, 3, we've got about 4 and
 24 a half to 5 -- the aisle is like five times the
 25 width of the seat showing this big expanse out here

1 where -- that's not what it looks like, is it?
 2 A. Yes, that's correct.
 3 Q. What's not correct?
 4 A. The aisle by comparison would be
 5 narrower.
 6 Q. So this really is a misconception, it's
 7 misleading, this diagram, isn't it, Mr. Sands?
 8 A. Yes, in that regard I think you could say
 9 it is.
 10 Q. They want to show this big open area
 11 where you can have all this air flow, right?
 12 You're smiling, right? They want to just sort of
 13 let everybody think, here, you've got this big open
 14 place and it's being -- the air being scooped out
 15 of the plane like a big vacuum machine, right?
 16 THE COURT: Are you asking a question?
 17 THE WITNESS: Is the question is whether
 18 they are trying to show that this is depicting
 19 something about a vacuum cleaner?
 20 BY MR. WEINSTEIN:
 21 Q. I'm trying to show that they're depicting
 22 something that doesn't exist, right?
 23 A. The way the picture is drawn, the aisle
 24 width is wider in this perspective than in a real
 25 plane.

1 Q. Everybody is a lot more pushed together
 2 and closer. In fact, this person here, if he's
 3 smoking and the persons over here are not smoking,
 4 they're real close together, aren't they? About
 5 this wide is the aisle, right?
 6 A. Yes, it's about that wide. Yes.
 7 Q. And on the diagram, which is a lot
 8 smaller, when I said about this wide, I mean, the
 9 diagram itself is even wider than the aisle. And
 10 we know this circle here they're trying to depict
 11 the width of the entire, well, what do you call it?
 12 A. That's the fuselage.
 13 Q. The fuselage. Well, this is an awful lot
 14 smaller than the actual fuselage, right?
 15 A. Yes, this is a schematic intended to show
 16 the major parts of the environmental control
 17 system. It's not designed --
 18 Q. It's what --
 19 THE COURT: Let him finish his answer.
 20 MR. WEINSTEIN: You're right, judge.
 21 THE WITNESS: It's not designed to show
 22 the actual dimensions of the airplane.
 23 BY MR. WEINSTEIN:
 24 Q. That's what some people call a schematic
 25 misrepresentation, isn't it?

1 A. No, I don't believe it.
 2 Q. Well, you just said that this aisle is,
 3 admitted, five times larger at least than what it
 4 actually is in comparison, correct?
 5 A. I repeat, the picture is not intending to
 6 show the dimensions across the cabin. It's not
 7 accurate in that regard. The picture is intended
 8 to show the basic parts of the environmental
 9 control system where the duct work goes, where
 10 parts are installed and basically the way the air
 11 comes.
 12 Q. Yeah, you also left out a little smoke
 13 there too, didn't you? You left out some smoke,
 14 too, didn't you? You didn't put in the smoke?
 15 A. We weren't intending to show the presence
 16 of smoke in this picture.
 17 Q. And matter of fact, you were talking
 18 about some -- something about the quality, how
 19 well, how it -- it's sort of recirculated every
 20 minute or two according to what you're saying,
 21 right?
 22 A. I didn't say a minute.
 23 Q. Tell me what you said.
 24 A. I said between two and three minutes the
 25 volume of air in the airplane is changed out with

1 Q. You agree that based on your -- you're a
 2 ventilation expert, correct?
 3 A. Yes.
 4 Q. And in becoming an expert in that area,
 5 you've got to know what you're dealing with, what
 6 you want to ventilate in and out of the container,
 7 correct?
 8 A. Yes, that's right.
 9 Q. And you know it's in your expertise that
 10 tobacco smoke is an irritant, correct?
 11 A. Yes. Now, wait a minute. That's not
 12 within my expertise. My expertise is the technical
 13 aspects of the design. I can't -- I have my own
 14 opinion about whether tobacco smoke is irritating
 15 or not. But it's not within my technical area to
 16 say --
 17 Q. In your own, please, excuse me, if I sort
 18 of run over your -- I should let you finish and I
 19 apologize.
 20 In your own opinion, it is an irritant,
 21 isn't it?
 22 A. Yes.
 23 MR. ENGRAM: Your Honor, I object,
 24 calling for personal opinion.
 25 THE COURT: He's already stated it once

1 another volume of air.
 2 Q. And after all of you -- and you had that
 3 information before it was banned, smoking was
 4 banned, correct?
 5 A. Uh-huh.
 6 Q. And they banned smoking on the airplane,
 7 didn't they?
 8 A. Yes, they did.
 9 Q. And that's after they had this so-called
 10 information that you are telling this jury,
 11 correct?
 12 A. Yes, that's right.
 13 Q. And you're happy they banned it, aren't
 14 you?
 15 A. Yeah, I think the cabin environment is
 16 generally more comfortable without environmental
 17 tobacco smoke.
 18 Q. And you testified in the past that you
 19 were happy they banned it?
 20 A. Yes.
 21 Q. Because you knew it was really quite an
 22 irritant; you testified to that, didn't you?
 23 MR. ENGRAM: Your Honor.
 24 THE COURT: Sustained.
 25 BY MR. WEINSTEIN:

1 before. Let's go to the next question
 2 BY MR. WEINSTEIN:
 3 Q. Incidentally, you came from eastern
 4 Oregon?
 5 A. Yes.
 6 Q. Flew here -- you came from a remote part
 7 of Oregon to testify here again really, correct?
 8 A. Yes.
 9 Q. I don't want you to be uncomfortable, so
 10 maybe you can --
 11 A. Want me to sit down again?
 12 Q. Yes.
 13 And you know, and you helped, I guess, to
 14 draw up all these sort of exotic diagrams and they
 15 prepared it for you, didn't they?
 16 A. Yes.
 17 Q. The tobacco lawyers, right? Or the
 18 people that work for them, right?
 19 A. Yes.
 20 Q. Now, of course, as an expert you also in
 21 learning how to and trying to ventilate the system
 22 to try to keep all these -- the contaminants from
 23 the people on the aircraft, you certainly would
 24 want to know the environmental conditions, that is,
 25 how many people generally would be on an aircraft

1 smoking, correct?
 2 A. Yes.
 3 Q. And that information is within your
 4 expertise and knowledge, correct?
 5 A. I do have knowledge of data sources that
 6 do characterize the number of smokers on an
 7 airplane. And those are the kinds of things that
 8 an aircraft ventilation system designer is required
 9 to know.
 10 Q. And one of the things that you know
 11 statistically in the '80s, from '76 throughout the
 12 entire '80s to the '90s on the average one-third,
 13 one-third of the people on the aircraft generally
 14 were known to be smokers, correct?
 15 A. Yes, that's my understanding.
 16 Q. Tell me how many -- well, let's take one
 17 of these exotic diagrams. A 707, how many people
 18 are on a 707?
 19 A. Roughly 170, 180 maybe on the upper end.
 20 Q. So we'll take, you said a third, a third
 21 of 180, that's how much?
 22 A. That would be 60.
 23 Q. Sixty smokers on there, right?
 24 A. Yes.
 25 Q. Now 60 smokers all at once, some may be

1 Q. I said I wasn't an engineer, but I took
 2 arithmetic.
 3 Now we have 767. How many people on a
 4 767?
 5 A. 210 approximately.
 6 Q. That's 70 people smoking, correct?
 7 A. Did you say smoking?
 8 Q. Smokers?
 9 A. Smokers, there may be as many as 70
 10 smokers.
 11 Q. Right. There may be. And of course
 12 there's nobody on that airplane saying, listen, all
 13 you 70 people only two can smoke at a time, right?
 14 There's no one on there telling them that?
 15 A. No.
 16 Q. In fact, they're probably all smoking,
 17 probably a lot of them are smoking in this aircraft
 18 at will, nobody preventing them, right?
 19 A. With the exception of the times when the
 20 no-smoking light might be turned on.
 21 Q. And that may have happened pretty
 22 frequently, because of people gasping for breath,
 23 correct?
 24 A. No, I don't know that to be the case.
 25 Q. Okay. Let me ask you this. 747, how

1 smoking, some may not. But if they're smokers,
 2 they're usually sitting in the smokers section if
 3 they want to smoke, correct?
 4 A. I suspect that's true.
 5 Q. And you're designing this system and you
 6 know about one-third in those days -- we know
 7 people don't smoke as much now, I realize that.
 8 But in those days up to 1990 from '76 I know you've
 9 testified before a third are smokers?
 10 A. Uh-huh.
 11 Q. How many people, seats are there on a
 12 727?
 13 A. Again, roughly 175.
 14 Q. 175?
 15 A. 180, just call it 180.
 16 Q. Sixty smokers assuming that everybody --
 17 that it's filled.
 18 How many smokers are there on an MD 80?
 19 A. Depending which model. It's a smaller
 20 airplane. Let's characterize it at 150.
 21 Q. All right. So there would be about 50
 22 people smoking, smokers on there?
 23 A. Approximately, yes.
 24 Q. It's an easy number, a third?
 25 A. Yeah.

1 many people?
 2 A. 360.
 3 Q. 360. That's 120 -- I'm getting better.
 4 120 people smoking at once, right? Are smokers on
 5 the plane?
 6 A. Yes.
 7 Q. And they all could smoke at the same
 8 time, nobody to prevent them, correct?
 9 A. Theoretically I suppose that could be
 10 true.
 11 Q. I know you're -- here's a big one, 1011,
 12 how many people on a 1011?
 13 A. Again, that's approximately 300.
 14 Q. So we've got another 100?
 15 A. Yep.
 16 Q. 100 people smoking that could smoke all
 17 at once, right?
 18 Now I realize -- okay, 757?
 19 A. 175 again, call it 180, gives you good
 20 numbers.
 21 Q. Now, if we take the 1011 with 100 people
 22 that are smoking at once and not being told, you
 23 know, that they can't. If I understand your
 24 testimony, you're saying that if all these 100
 25 people are smoking and the smoke is coming up, why

1 we've got this big every minute or less than that,
 2 all this smoke is being wooshed right out and
 3 nobody is being affected; is that your testimony?
 4 A. No, that's not.
 5 Q. Okay.
 6 A. I didn't say the smoke is wooshed out.
 7 And I don't know what your hand gesture suggests,
 8 but it was --
 9 Q. The point is, at least from your
 10 testimony, you said it's replaced. All the air is
 11 being replaced, how often did you say, how quick?
 12 A. Two to three minutes.
 13 Q. So in two to three minutes all the smoke
 14 from 100 people, it's all fresh again, right?
 15 A. It's been -- if it's recirculated air, it
 16 will have been filtered and it will have been mixed
 17 with the air from outside the airplane.
 18 Q. Now, you've got it filtered, right?
 19 You've got a filter?
 20 A. Yes.
 21 Q. You know, I'm kind of -- the word filter,
 22 you know, at the end of cigarettes they have a
 23 filter, right?
 24 A. Yes.
 25 Q. And a smoker that smokes comes through

1 Q. That filter, how often has that filter --
 2 is that filter changed?
 3 A. Well, as I testified earlier, it would
 4 depend on the airplane model and which filter
 5 installation we're talking about.
 6 Q. You've seen these filters clogged, brown,
 7 oozing with tar from the tobacco smoke that has
 8 existed in these air cabins, haven't you?
 9 MR. ENGRAM: Your Honor.
 10 THE WITNESS: I've seen filters removed
 11 from airplanes that have been filtering
 12 everything that's recirculated, including the
 13 environmental tobacco smoke constituents
 14 BY MR. WEINSTEIN:
 15 Q. Before they banned smoking, Mr. Sands,
 16 before ban, you've actually gone right up to them
 17 with all the gook on it and smelled it, didn't you?
 18 A. Yes, they do definitely carry a strong
 19 odor of tobacco.
 20 Q. That's what I was getting at, had a
 21 strong odor, odor of what?
 22 A. Tobacco smoke. They're very good at
 23 filtering out those products and they retain a very
 24 strong odor.
 25 Q. Like on a cigarette?

1 the filter, right? Those people get sick, even
 2 with the filter on it, doesn't it?
 3 MR. REILLY: Objection, Your Honor.
 4 MR. WEINSTEIN: Hear my question.
 5 THE COURT: Overruled. I don't think
 6 it's really on our particular subject, but
 7 I'll overrule it.
 8 THE WITNESS: You asked if people who
 9 smoke filtered cigarettes get sick?
 10 MR. WEINSTEIN: Yes.
 11 MR. ENGRAM: Your Honor, objection. It's
 12 beyond the scope of his expertise.
 13 BY MR. WEINSTEIN:
 14 Q. How about common sense? Common sense,
 15 you know, common sense, people who smoke filtered
 16 cigarettes get sick?
 17 MR. ENGRAM: Your Honor, beyond direct.
 18 THE COURT: Wait a minute. Why don't you
 19 ask -- I'll sustain the objection about common
 20 sense.
 21 I mean, you know, let's go ahead to the
 22 questions about the airplane.
 23 MR. WEINSTEIN: Now, so, well, I'm asking
 24 him about the filter, judge.
 25 BY MR. WEINSTEIN:

1 THE COURT: We've already done that.
 2 BY MR. WEINSTEIN:
 3 Q. Now, of course we also know Mr. Engram
 4 over there said something about this courtroom.
 5 Remember he brought up the subject of this
 6 courtroom and the filtering system here?
 7 A. I don't recall him talking about
 8 filtering system in this courtroom.
 9 Q. But we have a courtroom here and we've
 10 got a pretty high ceiling in this courtroom?
 11 A. Uh-huh.
 12 Q. Tell the -- how high is this?
 13 A. A good 20, 25 feet maybe.
 14 Q. So the smoke would rise up above sort of.
 15 Tell the jury how high the overhead is -- well, I
 16 don't know if I should show you this diagram,
 17 because we already said it really doesn't
 18 represent, but how high is the highest point of
 19 this sort of cylinder?
 20 A. It's between six and seven feet.
 21 Q. Six and seven feet. And they
 22 mentioned -- and they mentioned also about a house,
 23 comparing it to a house. Tell the jury how high
 24 the average ceiling is to a house?
 25 A. Well, it's between seven and eight feet

1 typically, sometimes a little higher.

2 Q. Most doors are seven feet, if you have a
3 door in a house, it's about eight feet, isn't it,
4 in a house, about eight feet?

5 A. Yes.

6 Q. So you're not dealing with six feet. And
7 in a house when you've got a -- rooms are generally
8 pretty square, I mean, you've got walls that are --
9 what's the word you engineers use, perpendicular?

10 A. Vertical.

11 Q. Vertical.

12 But we don't, on this diagram here, we've
13 got like this is a cylinder they're being
14 transported in. They don't even have walls that
15 give you extra space for the tobacco smoke to
16 settle in, correct?

17 A. Now, you're saying the airplane doesn't
18 have walls that you have extra space for the
19 tobacco smoke to settle in? That's what you've
20 asked me to --

21 Q. Well, what I'm saying is if this was
22 square, I mean, if you have a square room and
23 cross-section, right, you have more area?

24 A. You have more volume.

25 Q. Volume, correct?

1 A. Okay.

2 Q. And blowing out the smoke. And the front
3 of the cigarette has got a lot of tobacco smoke
4 coming here. And leaning over and maybe serving or
5 bringing coffee to somebody, please tell me where
6 that smoke -- how does it get around the flight
7 attendant before it's sucked out of there; how does
8 it do that?

9 A. Yeah, as I said earlier, the general
10 pattern of air flow is for the air to come in up
11 above either in the aisle area, some of it comes in
12 up overhead with the adjustable nozzle and the side
13 wall outlet. Then that air moving downward, it
14 mixes with the air that's in the space immediately
15 surrounding the passengers and it continues to move
16 downward. And then it exits out.

17 Q. Ah, so the smoke -- you're telling the
18 jury that the smoke from the cigarette of a
19 passenger doesn't rise, it goes down; is that what
20 you're telling them?

21 A. The smoke that a passenger exhales can
22 easily be exhaled in an upward direction. But that
23 occurring, the general pattern of air flow in the
24 cabin is still in a downward direction.

25 Q. So if -- you agree that without a

1 A. You have more volume in the room, that's
2 right.

3 Q. So we now have 100 people smoking, well
4 in an L-1011, or if they're all smoking at the time
5 and we have the shape of the cabin is such that
6 it's really smaller than if it was, you know,
7 square, correct?

8 A. Yes, that's right.

9 Q. Uh-huh. So the mere configuration of the
10 cabin lends to the smoke really being more
11 concentrated because it's in a lesser volume area,
12 correct?

13 A. No, I think what you -- I'm not quite
14 sure what you're trying to characterize, but in
15 fact, the parameter that's important is where the
16 smoke is relative to the ventilation air that's
17 affecting it.

18 Q. And of course you'll agree that if
19 anybody is, well, again, I don't want to lift this
20 up because it's a mischaracterization as you said,
21 but let's assume that, well, let's just do it in
22 words.

23 If a flight attendant is serving people
24 and leaning over, if someone has a cigarette here,
25 sitting here, let's say this is -- all right?

1 ventilation system the natural consequence of
2 tobacco smoke would be to rise?

3 A. Oh, yes. Oh, absolutely.

4 Q. So now we've got the natural character of
5 the smoke is trying to rise. And then we got your
6 ventilation system pushing it back down, right?

7 A. Yes.

8 Q. So the question is, what's a stronger
9 force which might well cause it just to hover
10 there? The force coming up that would naturally
11 cause the smoke to rise and your ventilation system
12 putting it down and it could just sort of settle
13 there, equal force, didn't you engineers know about
14 that equal forces in opposite directions, I heard
15 that somewhere.

16 A. Of course what you maybe don't understand
17 is the concept of buoyancy and the concept of
18 temperature and the way that it affects that
19 buoyancy.

20 The air flow discharged from a person
21 smoking a cigarette will be roughly at body
22 temperature, maybe little tiny bit warmer. So
23 while that smoke may have enough buoyancy to rise
24 up slightly, overcoming that downward air flow in a
25 very short time, that air and smoke mixture will be

1 mixed. And the temperature will be cooled down in
2 such a way that it no longer has that character of
3 buoyancy that's required to keep it aloft.

4 So while you may have some amount of
5 smoke that does rise for a bit, in a very short
6 time it will be among those particles that are
7 exiting at floor level.

8 Q. In a very short time, eventually, you're
9 saying that it will sort of like go down instead of
10 up, right?

11 A. Yes.

12 Q. Tell me why is it that people and flight
13 attendants when they would take their luggage and
14 put it in the overhead and they would open up their
15 luggage it would smell from smoke; how did that
16 smoke get up there if you're saying it went down?

17 A. The odor that -- that's associated with
18 environmental tobacco smoke is something that you
19 can detect at very, very low levels. And virtually
20 anything in the cabin will be subject to -- will be
21 in contact with -- on a smoking flight with
22 relatively low levels. Maybe, maybe at higher
23 levels if it's down in the passenger cabin where
24 the smoke levels are higher.

25 Q. You don't dispute that the luggage would

1 times, the smoke may rise up, particularly if
2 the passenger exhales in an upward direction,
3 of course it's propelled upward.

4 BY MR. WEINSTEIN:

5 Q. Then we have what you call what is like a
6 fighting force of the tobacco naturally wanting to
7 go up, being propelled up and your ventilation
8 system pulling it back down?

9 A. The tobacco doesn't have any inherent
10 property making it want to go up. The particles,
11 when they're exhaled or when they're liberated from
12 the tip of the cigarette will typically be warmer
13 than the ambient air. And it takes a short period
14 of time for those particles to cool down and lose
15 that buoyant effect.

16 Q. Could the particles be that which gave it
17 the odor, you know, the odor in the luggage, could
18 it be those particles?

19 A. Well, some aspect of that environmental
20 tobacco smoke certainly carries the odor. I'm not
21 an expert in ETS constituents, so I would have to
22 refrain from drawing any conclusion about what
23 actually causes the odor.

24 Q. But you mentioned particles, that would
25 have the odor, right?

1 smell from tobacco smoke?

2 A. No, I don't dispute that a bit.

3 Q. So we got odor that got up there, but not
4 the smoke, right? Is that your testimony?

5 A. As I said, some amount of that smoke can
6 go up for a short period of time. What I also said
7 is that after a short period of time it would be
8 carried out. So it's not like the smoke goes up
9 there and just hides or remains. It may -- it may
10 pass upward before it finds its way out.

11 Q. So it goes up to about as high as six
12 feet then starts coming back down after it's gone
13 through the people and their nostrils and maybe
14 even sinuses, gone up there, and then comes right
15 back down through them again, right?

16 MR. REILLY: Objection, Your Honor.

17 THE COURT: Well, what's the objection?

18 MR. WEINSTEIN: Could you answer that?

19 MR. ENGRAM: Your Honor, the objection is
20 it's beyond the scope of this witness'
21 expertise.

22 THE COURT: I don't know about that. But
23 it's certainly not a real clear question.

24 But you can answer it if you can.

25 THE WITNESS: As we've said a number of

1 A. That's what I'm saying. I'm not telling
2 you what part of ETS carries the odor.

3 Q. And of course you don't know what affect
4 particles, minute particles have on the nose and
5 the eyes and the sinuses, do you?

6 A. No, no, I'm not a doctor.

7 Q. Do you know anything about carbon
8 monoxide?

9 A. I understand what it is from a chemistry
10 standpoint.

11 Q. Yes, you know that it's a colorless,
12 odorless poison, correct?

13 A. Yes.

14 Q. So therefore, if you assume, as we've
15 heard, that carbon monoxide is in tobacco smoke?

16 MR. REILLY: Objection, Your Honor.

17 THE COURT: I don't remember if that was
18 in the evidence. It may have been.

19 MR. WEINSTEIN: Yes, it was.

20 THE COURT: It may have been

21 BY MR. WEINSTEIN:

22 Q. If we assume that, even though we see
23 smoke in tobacco smoke, there's something else
24 there we can't even see, carbon monoxide, because
25 it's colorless and odorless. So there's something

1 even more than the smoke that we see, correct?
 2 A. Yes, carbon monoxide is present in this
 3 room right now. It's present in a number of places
 4 from --
 5 Q. But you're not a physician and you don't
 6 know that it kills people, doesn't it?
 7 A. No, I can't speak to its health effects.
 8 Q. And you remember, don't you, that you
 9 could, noticeably, in the air during the years when
 10 you were in the smoking areas in flights, you could
 11 see the smoke, couldn't you?
 12 A. Yes.
 13 Q. And that was true when you flew in the
 14 '80s, correct?
 15 A. Yes.
 16 Q. And the ban that took place around 1990,
 17 you no longer saw that condition, correct?
 18 A. That's correct.
 19 Q. And you were a smoker yourself in those
 20 days, weren't you?
 21 A. Yes, I was.
 22 Q. And you quit for health reasons?
 23 A. Yes.
 24 Q. And you've experienced burning of your
 25 eyes because it was an irritant to you?

1 A. Yes, I find it objectionable.
 2 Q. Have you learned or heard about whether
 3 or not pilots were requested to turn on the
 4 no-smoking signs pretty frequently, huh?
 5 A. Well, I don't know about frequency, but I
 6 do know it's among the things that flight
 7 attendants do ask for, was anyway.
 8 Q. Right. And they would request it, well,
 9 you know why they would request it, right?
 10 A. Yes.
 11 Q. Can we agree that filters still allow
 12 toxins and smoke to come through them?
 13 A. Some fraction of those things do pass
 14 through the filter, yes.
 15 Q. And as a matter of fact, you yourself, in
 16 your expertise, you yourself have witnessed on the
 17 outside skin --
 18 MR. ENGRAM: Objection, Your Honor.
 19 Irrelevant, beyond the scope of the direct.
 20 And it's subject to a prior conference with
 21 the Court.
 22 THE COURT: Yes. You were going to ask
 23 to approach the bench if you wanted to bring
 24 this up. Do you remember?
 25 MR. WEINSTEIN: I thought it had to do

1 with -- well, I'll explain it.
 2 (A bench conference occurred as follows:)
 3 THE COURT: Now, it was going to come up
 4 through another witness, but it sounds like
 5 the same question.
 6 MR. WEINSTEIN: I was going to ask him if
 7 he witnessed many times -- I know he's
 8 testified to this -- on the outside skins,
 9 stains, which he identified as having a
 10 tobacco smell.
 11 THE COURT: Is there an objection?
 12 MR. ENGRAM: Yes, Your Honor. Number
 13 one, it's beyond the scope of his direct. He
 14 didn't talk anything about the exterior.
 15 THE COURT: I don't believe it's beyond
 16 the scope because he's talking about
 17 ventilation skin.
 18 Any other objections?
 19 MR. ENGRAM: Your Honor, the Court's
 20 prior ruling I understood to be that if there
 21 was no discussion of the outflow valve that
 22 this wasn't going to come in.
 23 THE COURT: Well, and we stayed away from
 24 that.
 25 MR. McCUE: Your Honor, also with regard

1 to what was argued in the motions in limine
 2 talking about when these photographs were
 3 taken.
 4 THE COURT: We're not talking about the
 5 same witness. I realize it's the same
 6 question. I don't believe it's beyond the
 7 scope of the direct because if you're talking
 8 about the ventilation systems, I guess it's
 9 part of the ventilation system. And to just
 10 ask if there was stuff that came out and he
 11 saw it and it smelled like tobacco. I think
 12 I'll let it in.
 13 But while you're here. We need to bring
 14 this to a close as soon as possible, if
 15 possible. If you need more time, I might have
 16 to ask him to come back tomorrow. It's
 17 quarter to 6:00. I don't want to have to do
 18 that. How much more time do you think you
 19 have?
 20 MR. WEINSTEIN: Ten, 15 minutes.
 21 THE COURT: Okay. Aye, aye, aye.
 22 (The bench conference ended.)
 23 THE COURT: Let's go ahead.
 24 BY MR. WEINSTEIN:
 25 Q. As I was asking, as I was saying, you

1 have seen these outflow valves?
 2 A. Yes.
 3 Q. And tell -- when smoking was permitted,
 4 tell the jury what it looked like.
 5 A. Beyond the outflow valve of the airplane
 6 it's typical -- it was typical before smoking was
 7 disallowed. And it's still typical to see some
 8 staining of the aircraft skin. And that staining
 9 is the consequence of particulate that's in the
 10 cabin air being deposited on the skin as the air
 11 pressure drops drastically with the air exiting
 12 that valve. So the --
 13 THE COURT: The skin of the airplane
 14 you're talking about?
 15 THE WITNESS: That's right. So that the
 16 air flow being discharged from that valve is
 17 the air that's exhausted from the lavatories,
 18 the air that's exhausted from the galleys.
 19 And typically airplanes have a system that
 20 carries a duct work system that brings that
 21 exhaust air down to the outflow valve.
 22 So what you see on the outside of the
 23 airplane is whatever deposits, whatever
 24 particulate was in the cabin air and the
 25 lavatory and the galley air, it's

1 characteristically deposited on the aircraft
 2 skin just beyond that valve.
 3 BY MR. WEINSTEIN:
 4 Q. Really my bottom line question was: When
 5 smoking was permitted it would be very colored and
 6 brown, correct? It would be darkened, correct?
 7 A. Yes, just as it is today. It's
 8 characteristically brown even now.
 9 Q. Oh, is that right?
 10 A. Yes, it is.
 11 Q. Do you recall, won't you admit that since
 12 smoking was banned these outflow valves are not as
 13 dirty or as stained as they were when smoking was
 14 permitted?
 15 A. Yes, there's less of that staining now.
 16 Q. And you've testified -- you've admitted
 17 that before, haven't you?
 18 A. Yeah, that's a fact.
 19 MR. REILLY: Objection.
 20 THE COURT: Sustained. But he's already
 21 said it.
 22 BY MR. WEINSTEIN:
 23 Q. And, of course, Mr. Engram was talking
 24 about a house, right, and ventilation?
 25 A. Yes.

1 Q. Generally speaking, in a house where a
 2 family lives you might have one person smoking or
 3 two persons at most, correct?
 4 A. Um, I would --
 5 THE COURT: This is -- you can make some
 6 argument later about this, but it really isn't
 7 within his expertise about how many people
 8 smoked in a house.
 9 MR. WEINSTEIN: Well, there is a lot of
 10 difference between the number of smokers on an
 11 airplane and the concentration of the tobacco
 12 because of the numbers as compared to a home
 13 where you might have one or two persons.
 14 MR. ENGRAM: Your Honor, same objection.
 15 It's beyond the scope.
 16 THE WITNESS: No, that's not true.
 17 MR. WEINSTEIN: I'll withdraw the
 18 question, judge.
 19 MR. WEINSTEIN: Judge, I just have to
 20 review my notes.
 21 THE COURT: You may. You certainly may.
 22 MR. WEINSTEIN: Judge, may I just consult
 23 for a moment?
 24 THE COURT: Of course. With your
 25 colleagues, you may.

1 MR. WEINSTEIN: Thank you, judge.
 2 I do have a lot more questions, but I'm
 3 not going to ask them, judge.
 4 THE COURT: Good advice from your
 5 colleagues.
 6 Is there anything further from the
 7 defense?
 8 REDIRECT EXAMINATION
 9 BY MR. ENGRAM:
 10 Q. Just a couple of points on redirect.
 11 Mr. Sands, on cross examination you were
 12 asked if you had information from the '80s and '90s
 13 or knowledge of data sources that characterize the
 14 numbers of smokers on airplanes. Do you remember
 15 that question?
 16 A. Yes, I do.
 17 Q. In 1989 was there a study conducted by
 18 the United States Government that actually counted
 19 the number of smokers compared to the number of
 20 passengers?
 21 MR. WEINSTEIN: Objection, Your Honor.
 22 THE COURT: What's your objection?
 23 MR. WEINSTEIN: '89, that's when it was
 24 banned.
 25 THE COURT: The study may have been in

1 '89. Did it reflect some other years?
 2 MR. REILLY: In '89 there was only a
 3 partial ban in effect.
 4 THE COURT: Just make it clear what the
 5 study -- the period of time that the study was
 6 focused on.
 7 MR. ENGRAM: Yes, Your Honor.
 8 THE COURT: If that's clear, I don't
 9 know.
 10 BY MR. ENGRAM:
 11 Q. Mr. Sands, you're familiar with the 1989
 12 U.S. DOT airliner study, correct?
 13 A. Yes, I am.
 14 Q. Did that -- how many flights did that
 15 study measure environmental tobacco smoke on?
 16 A. I believe there were --
 17 MR. WEINSTEIN: Your Honor.
 18 THE COURT: Do we know the period of time
 19 that it was measured?
 20 THE WITNESS: Yes. It was measured in --
 21 the measurements were taken in 1988 and 1989.
 22 MR. WEINSTEIN: But again, Judge, my
 23 objection is on another ground.
 24 THE COURT: What?
 25 MR. WEINSTEIN: Any study like that which

1 wasn't brought up --
 2 THE COURT: No, you asked a question
 3 about this and so I'm going to let him answer.
 4 You asked the question about what percentage
 5 of smokers based on studies and so on. So go
 6 ahead.
 7 BY MR. ENGRAM:
 8 Q. How many flights did they measure
 9 constituents of environmental tobacco smoke on, the
 10 U.S. Government measure?
 11 A. It was on the order of 60 smoking
 12 flights.
 13 Q. I'll hand you the study. It's been
 14 marked for purposes of identification as Defense
 15 Exhibit 2123.
 16 A. Okay.
 17 MR. WEINSTEIN: Your Honor, may we
 18 approach the bench? He's handing him --
 19 THE COURT: He can look at it. It's for
 20 ID. He's not talking about it right now.
 21 But what is your question?
 22 MR. ENGRAM: My question is going ask
 23 that he be more specific than 60 something
 24 flights.
 25 THE WITNESS: I believe it was 62. But

1 I'll have to look it up specifically.
 2 MR. WEINSTEIN: Judge, may I approach?
 3 THE COURT: You may.
 4 (A bench conference occurred as follows:)
 5 MR. WEINSTEIN: Judge, he cannot take
 6 now, after I asked him questions that he had
 7 previously testified on a study, not of a
 8 study of what the percentage was he previously
 9 testified to a third.
 10 Now what he's doing, judge, is he's
 11 trying to use him as a conduit for some study
 12 that is hearsay bringing up a different study.
 13 He might be able to ask the information where
 14 he got the one-third and all that where he got
 15 the information from. But now he's bringing
 16 in a new study that I can't cross examine.
 17 MR. ENGRAM: You opened the door to it.
 18 MR. WEINSTEIN: It's hearsay.
 19 THE COURT: But you asked this question
 20 do you have any information about how many,
 21 what percentage of people are smokers. And he
 22 said, yes, he had, the third or whatever it
 23 was. So what does this show?
 24 MR. ENGRAM: I want to show that they
 25 measured smoking on 69 flights, combination of

1 domestic and international, that there was an
 2 average number of smokers on flights and what
 3 the average numbers of passenger --
 4 THE COURT: What was the percentage?
 5 MR. ENGRAM: 13.7.
 6 THE COURT: So, I mean, what was the
 7 other study that's the one-third?
 8 MR. ENGRAM: There isn't another study.
 9 MR. WEINSTEIN: I'll show you exactly
 10 what it was.
 11 THE COURT: What did he base his
 12 testimony on a third?
 13 MR. ENGRAM: On his statement about a
 14 third, the range did include the third.
 15 THE COURT: Since you brought this up
 16 about the third.
 17 MR. WEINSTEIN: I'll show you exactly
 18 where he got the third from, judge.
 19 THE COURT: It doesn't matter because he
 20 can ask him about other studies.
 21 MR. WEINSTEIN: I didn't bring up a
 22 study. Judge, let me show you.
 23 THE COURT: No, because you asked him
 24 this question based on his information how
 25 many people smoked.

1 MR. WEINSTEIN: Here.
 2 MR. ENGRAM: And you specifically said
 3 studies from the '80s.
 4 MR. WEINSTEIN: Let's be precise here,
 5 judge.
 6 THE COURT: Well, we've got the record of
 7 what you asked.
 8 MR. WEINSTEIN: Here is what he said.
 9 "Well, I know from the research done by the
 10 National Academy that the time frame in the
 11 '80s tended to be a third or 33 percent or so
 12 on flying passengers."
 13 THE COURT: You're looking at his prior
 14 testimony. The question that you asked him
 15 here was: Do you have some studies or
 16 something that show how many people smoked?
 17 He said: Yes, a third.
 18 But now I'm going to let the Defendants
 19 refer to some other studies if it's a
 20 different measurement.
 21 MR. WEINSTEIN: Can I go back and say
 22 when you said a third you were basing it on
 23 National Academy, I should be able to do that.
 24 THE COURT: Maybe I'll see what the
 25 question is.

1 (The bench conference ended.)
 2 THE COURT: Okay.
 3 BY MR. ENGRAM:
 4 Q. Mr. Sands, how many smoking flights did
 5 the U.S. Government measure smoking on?
 6 A. I'm sorry, the entire report that we were
 7 referring to is not here and so I can't confirm the
 8 number, but I know it to be over 60. So I know in
 9 the entire study there were 92 flights and I know
 10 that the study involved over 60 smoking flights.
 11 So roughly two-thirds of the flights were smoking
 12 flights.
 13 MR. WEINSTEIN: Judge, can we find out
 14 the year.
 15 THE COURT: He's already said 1989.
 16 THE WITNESS: The report was done in 1989
 17 and the data was collected prior to that in
 18 1988 and 1989
 19 BY MR. ENGRAM:
 20 Q. And on those flights what were the
 21 average number of smokers per flight as reported by
 22 the government?
 23 A. I recall that the range of numbers of
 24 smokers was from a relatively small number of three
 25 all the way out to 62, I believe. So this, of

1 course, was a research program that involved a wi
 2 range of aircraft, some of them narrow-body
 3 aircraft and some of them wide-body aircraft.
 4 747s, 757s. So, but anyway, I think the largest
 5 number of smokers they found was 63.
 6 Q. And the average, either the average
 7 number of smokers per flight or the average number,
 8 percentage of smokers on the flight, do you have
 9 that information?
 10 A. Yes, it was less than 20 percent at that
 11 time.
 12 THE COURT: Okay, I hope there isn't too
 13 much more. It's already close to 6:00.
 14 MR. ENGRAM: Yes, Your Honor.
 15 BY MR. ENGRAM:
 16 Q. The fact that you were asked some
 17 questions about the filters and the staining on the
 18 aircraft skin, what does this show about the
 19 effectiveness of the filters and the ventilation
 20 systems on board aircraft when smoking was allowed?
 21 A. Well, those filters do collect a lot of
 22 particulate. They do a very good job of filtering
 23 and they do get dirty.
 24 Q. And if there is particulate on the skin
 25 or on the filter, what does that say about how

1 well, the system is working?
 2 A. Well, one could conclude that those
 3 particulates are no longer in the cabin air. So to
 4 that extent, the system is doing what it's supposed
 5 to do.
 6 MR. ENGRAM: Thank you, I have no further
 7 questions.
 8 THE COURT: The only thing I'm going to
 9 let you do is refer to that other study.
 10 MR. WEINSTEIN: Thank you, Your Honor.
 11 RECROSS EXAMINATION
 12 BY MR. WEINSTEIN:
 13 Q. Sir, isn't it true that you know from
 14 research done by the National Academy of Sciences
 15 that in the time frame of the '80s it tended to be
 16 a third or 33 percent or so of flying passengers,
 17 that is, smokers?
 18 A. I agree that report did -- the National
 19 Academy of Sciences' report from 1986 did report
 20 approximately a third.
 21 Q. And that was during the '80s?
 22 A. Yes.
 23 MR. WEINSTEIN: Thank you. No further
 24 questions.
 25 THE COURT: Okay. I think that's it.

1 You're free to go.

2 Okay, 6:00, we especially have had a long
3 day. The jurors, I'm sure, feel like they've
4 had quite a long day.

5 So we're going to recess today. And I
6 believe we'll start tomorrow at 9:15. And
7 tomorrow I know that there will be at least
8 one witness here in person and two witnesses
9 on videotape. If we get to both of them?

10 MR. REILLY: I know there will be one
11 videotape for sure and one live witness for
12 sure, Your Honor.

13 THE COURT: We're getting to the end more
14 or less, slowly, but we're getting there. So
15 we'll start tomorrow at 9:15.

16 Thanks for your attention, please don't
17 discuss the case with anybody. You're free to
18 go.

19 (Witness excused.)

20 (Jury exits courtroom.)

21 THE COURT: What is Dr. Teaf's testimony
22 about?

23 MR. ENGRAM: He is a toxicologist at
24 Florida State.

25 THE COURT: Okay, so is Dr. Teaf going to

1 be your first witness? Do you think that will
2 be your first witness?

3 MR. REILLY: Yes.

4 THE COURT: Then we have the tape of
5 Stammberger and the tape of Ogden, right.

6 MR. REILLY: Well, I know that the -- all
7 I know is that the people that are making the
8 tape --

9 THE COURT: They're working hard.

10 MR. REILLY: -- are working hard.

11 (Trial adjourned at 6:00 p.m.)
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